June, 1957 Vol. 46 No. 6

INDUSTRIAL ARTS AND VOCATIONAL EDUCATION

The Shop Teachers' Professional Magazine

AVA PRECONVENTION NUMBER

The first dividend is $4,000,000

The engineers for the Illinois Toll Highway Commission were confronted with the problem of how to build 200 bridges when steel was in very short supply. A possible solution was conceived by adapting construction techniques developed for the Lake Pontchartrain Causeway . . . a causeway nearly 25 miles long built of precast prestressed concrete members. The results of a test highway bridge using this new technique were most significant. Not only were lengthy delays avoided, but it was found the 200 bridges could be built in half the time required if steel was immediately available and at a savings of $20,000 per bridge. Thus, with 200 bridges to build, the first dividend on a new idea from America's engineers is $4,000,000.

This story is typical of the American engineer and the products of his creative genius. But where does this genius come from? History shows us it is *not* hereditary. Distinguished engineers, both past and present, in most cases came from average homes; and as youths their appearance wasn't any different than the lads who crowd our classrooms today. This creative genius, the spark of achievement, slumbers in every student. Whether this spark is fanned into a flame before it is smothered decides the student's future. Time and time again, instructors of mechanical drawing have witnessed the awakening of this inner genius. Here the student discards his boyish fancies for the practical and achieveable. During these formative days, impressions are indelible . . . good and bad. For this reason the student's drawing instruments should be selected with exacting care. Drawing instruments are basic tools of every engineer, and inferior instruments will never inspire skilled workmanship. Drawing instruments are a lifetime possession, and the only instruments worthy of consideration are the very best the student can afford. Precision inspires precision . . . perfection inspires perfection.

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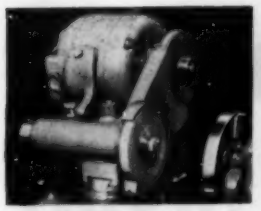

External Grinder

Milling Attachment

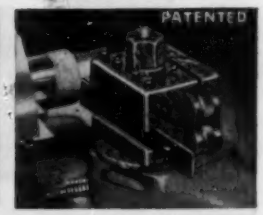
Handlever Tailstock

Handlever Bed Turret

Telescopic Taper Attachment

Handwheel Collet Attachment

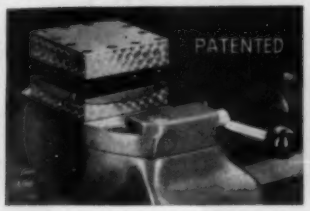
Handlever Collet Attachment



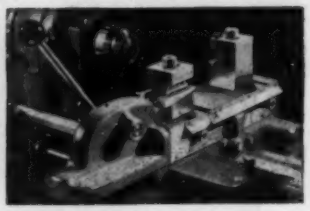
10 in 1 Tool Holder

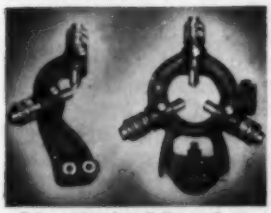
Ball Bearing Live Center

Adjustable Collet Bushing Chuck



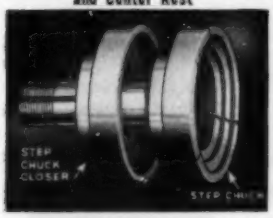
Square Turret Tool Block


Handlever Double Tool Cross Slide


Telescoping Jaw Follower Rest and Center Rest

Collet Rack

Steel and Brass Collets



Step Chucks and Closers

Centers and Drill Pads

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- *Give Students More Experience*
- *Duplicate Production Practices*
- *Simplify Difficult Jobs*
- *Increase Variety of Projects*

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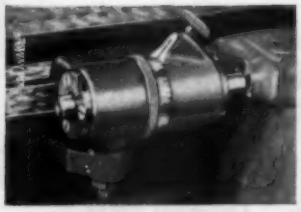
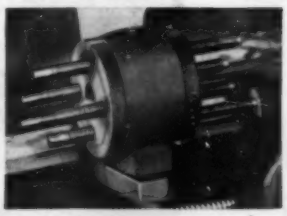
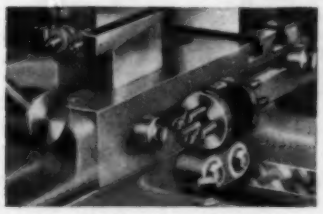
SOUTH BEND LATHE
SOUTH BEND 22,
INDIANA

Thread Indicator

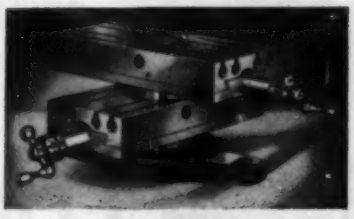

Micrometer Carriage Stop


Four Position Carriage Stop


Four Position Cross Slide Stop

Dial Indicator Carriage Stop

Coolant Pump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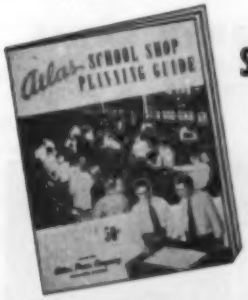
And they have these important safety features: tapered key drive spindle nose . . . completely enclosed underneath drive..."safety" apron and quick-change control features . . . completely enclosed headstock, apron, quick-change box.

Be sure to investigate Clausing and *compare* before investing in *any* lathe.

Safety Sam Says:
Write for free Safety Sam posters, and catalogs.



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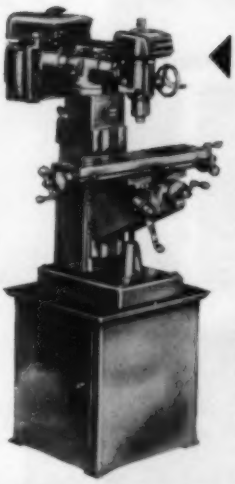
(65c outside U.S.A.)



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A heavy-duty drill with many exclusive features for long-service life. Drills to center of 18¼" circle. Capacity, ¾" in steel, 1" in cast iron — 6½" spindle travel.

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JUNE
1957

VOL. 46 NO. 6

Industrial Arts and Vocational Education

The Shop Teachers' Professional Magazine

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☆ ☆ ☆

This Month's Cover

The cover picture of this issue was submitted by Harry A. Goldstein, A.P.S.A., instructor of photography in the Graphic Arts Department, Tucson High School, Tucson, Ariz.

He is shown in the picture carrying on the work of his class with a group of students.

☆ ☆ ☆

Your Change of Address

If you are going to change your mailing address, at which you have been receiving the INDUSTRIAL ARTS AND VOCATIONAL EDUCATION magazine during the past year, please notify us at once so you will not lose any of the magazines for the 1957–58 school year. If you will let us have this information before August 15, you will be sure of receiving your magazine regularly.

Kindly give us your old address, as well as the new, and include your zone number.

☆ ☆ ☆

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YOUR SHOP NEEDS AN AMF DEWALT FOR SAFER, EASIER STUDENT TRAINING

See why at Booth 120—National A. V. A. Convention in Philadelphia

MODEL GA for Vocational Training

12- and 14-inch radial arm saws. 12" blade cuts 3½" deep, 14" blade cuts 4½" deep. Rips 28¾" wide, cross cuts 16" x 1" with standard arm. (Longer arm available.)

Uniform box-section non-retractable cantilever arm rotates 360° around the supporting column. Top-elevating crank. Quick-set miter locating latches at 0° and 45°. Eight (8) ball-bearing roller head rides directly on machined trackways inside arm. Direct-drive, totally-enclosed, fan-cooled motor (3425 r.p.m. full load), manual thermal switch. Calibrated miter, bevel, and rip scales, positive bevel-locating latches 0°, 45° and 90°. Steel table with legs, wood top. 14" diameter automatic safety guard with kickback device. (Select motor, saw blade and arm size from models shown below.) Power safety brake (optional).

Model	Std. Saw Blade	H.P.	Motor 3425 R.P.M.
GAK	12"	2	Single-phase, 60-cycle AC, 115/230 volts
GAN	14"	3	Three-phase, 60 cycle AC, 220/440 or 550 volts
GAO	14"	3	Three-phase, 60-cycle AC, 115/230 volts
GAR	14"	5	Three-phase, 60-cycle AC, 220/440 or 550 volts

MODEL GW for Industrial Arts

10-inch radial arm saw, cuts 3" deep, rips 26" wide, cross-cuts 16" x 1". Uniform box-section non-retractable cantilever arm rotates 360° around the supporting column. Top-elevating crank. Quick-set miter locating latches at 0° and 45°. Four (4) ball-bearing roller head rides directly on machined trackways inside arm. 1½ h.p. direct-drive, protected, fan-cooled motor (3425 r.p.m. full load), manual key switch. Calibrated miter, bevel, and rip scales, positive bevel-locating latches 0°, 45° and 90°. Steel table with legs, wood top. 10" diameter saw and "Auto-float" safety guard with kickback device. Power safety brake (optional).

Model	Saw	H.P.	Motor 3425 R.P.M.
GW-I	10"	1½	120/240 volts, 1-phase, 60 cycles AC
GW-M	10"	1½	220, 440 or 550 volts, 3-phase, 60 cycles AC (Specify One Voltage)

AC 2-phase or 50 cycles available on request for GA and GW.

Let your local De Walt Dealer show you why De Walt is the safest, most efficient, easiest-to-use woodworking tool of all... how it makes *teaching* easier.

You need De Walt SAFETY. *Only the AMF De Walt® Power Saw* offers you such a combination of safety features.

Top-side cutting action lets the operator see the blade *and* the layout mark for every cut. Blade action holds the material down and against the fence for added safety. *Pull-across cutting* lets the operator move *with* the saw for most cuts, not against it as with other tools. *All controls are above* the table and clearly marked for safe, sure set-ups every time. *Original Safety Key Switch* prevents unauthorized use. *Work is always level* and moves in a straight line – you fit the *saw* to the *work*, not vice versa as with other tools. No balancing lumber at awkward and dangerous angles. *Exclusive tool guard* adds still greater safety – completely encloses shaper knives and other tools, yet adjusts to any size lumber in seconds. *Special De Walt Power Brake* stops saw blade in a few seconds for maximum protection. *Spir'Ator Safety Return* automatically draws motor and blade to a safe position when released.

You need De Walt EFFICIENCY. One De Walt Power Saw actually does the work of *12 different power tools* – and does each one *as well or better* than a single purpose machine!

As a saw, De Walt makes every possible cut, quickly, safely, with unsurpassed accuracy. Instantly adjusts to any miter, bevel, or compound angle – sets up for either right- or left-hand ripping. Allows repeated cuts from one marking. *With a dado head*, De Walt's *precision depth control* and *top-side cutting* give on-the-line accuracy for all cuts. *Full-tilting arbor* simplifies rabbeting, grooving, radius and saucer cuts. *As a shaper*, De Walt provides maximum flexibility by tilting, raising, or lowering to *any* desired position – gives a *full 50% more shapes per cutter.* And you have another rotary tool every time you attach a different head to De Walt's powerful direct-drive motor. *Your one De Walt gives unsurpassed efficiency for every cutting job.*

You need De Walt PRACTICALITY. No other single piece of woodworking equipment makes as much "sense" as a De Walt in your shop, because no other offers such practical advantages.

With De Walt's great versatility, you can often save the cost of a number of other machines which frequently stand idle. Your De Walt will be the most-used machine in the shop. The De Walt can be placed and operated *against a wall – takes up 75% less space than old style table saws.* And with a De Walt, you can be sure you are training your students on the kind of equipment they will later use. For De Walt is the choice of woodworkers throughout industry – for carpentry, construction, pattern shops, cabinetry, maintenance and crating departments – tried and proved by *millions* of operators.

You may have seen the De Walt Power Saw demonstrated at the National or your State Convention. If not, *see your Dealer* for a demonstration. Send the coupon below for your FREE copy of "Job-Tested Cutting Methods". Valuable new shop teacher's aid now available—"Easy Ways to Expert Woodworking"—just $3.95.

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Association News

COMING CONVENTIONS

June 3–7. Wyoming Vocational Agriculture Teachers Association, at Laramie, Wyo. Secretary, Wayne Lynn, Byron, Wyo.

June 10–14. Colorado Vocational Association, at Colorado State University, Fort Collins, Colo. President, Fred Ricks, Fort Morgan, Colo.

June 12. Minnesota Vocational Agriculture Instructors Association, at Moorehead, Minn. Secretary, Mike Cullen, Willman, Minn.

June 13–14. Georgia Vocational Association, at Biltmore Hotel, Atlanta, Ga. Secretary, R. F. Greeson, State Office Bldg., Atlanta, Ga.

June 15. National Council of Technical Schools. Secretary, H. E. McCallick, Chicago Technical College, 2000 S. Michigan Ave., Chicago 16, Ill.

June 30–July 6. National Education Association, at Philadelphia, Pa. Secretary, William G. Carr. 1201 16th St. N.W., Washington, D. C.

July 9–13. Pelican State Vocational Association, at Southern University, Baton Rouge, La. Secretary, C. H. Chapman, Southern University, Baton Rouge, La.

July 21–24. National Audio-Visual Convention and Trade Show, at Morrison Hotel, Chicago, Ill. Secretary, Don White, 2540 Eastwood Ave., Evanston, Ill.

July 28–Aug. 2. International Graphic Arts Education Association, at Rochester Institute of Technology, Rochester, N. Y. Secretary, Sam M. Bart, 5738 Connecticut Ave. N.W., Washington 15, D. C.

Aug. 5–9. American Vocational Association, at Philadelphia, Pa. Executive Secretary, M. D. Mobley, 1010 Vermont Ave. N.W., Washington, D. C.

THE 1957 AMERICAN INDUSTRIAL ARTS ASSOCIATION CONVENTION

Kansas City, Mo., was host to the American Industrial Arts Association on April 23, 24, 25, and 26, during which time this group of industrial educators held their nineteenth annual convention.

The meetings were all well attended, and a total of 1200 registered at the registration desk.

The American Council of Industrial Arts Supervisors, and the American Council on Industrial Teacher Education, both of which are affiliates of the American Industrial Arts Association, met on Tuesday and Wednesday, April 23 and 24.

This was the eighth annual convention of the Council of Industrial Teacher Education. In their seven programs they discussed the following themes: "Industrial-Arts Teacher Education Faces the Future," "The Changing Role of Industrial-Arts Teacher Education," "Improvement in and Through Industrial-Arts Teacher Education," and "Industrial-Arts Teacher Education in the Years Ahead."

At the business meeting of this group, John Fuzak was elected president; Ray Karnes, 1st vice-president; Guy Wall, treasurer; and William Tierney, secretary.

The Council of Industrial Arts Supervisors, in this their seventh annual convention, had their discussions based on the following themes: "Industrial Arts Evaluation and the Need for State and Local Supervisors," "Industrial Arts at the Various Levels and Shop Planning," "What are the Industrial Arts State Associations Officers Doing," and "The Perfect Graphic-Arts Program."

The new officers of the American Council of Industrial Arts Supervisors are John M. Hurley, president; M. J. Ruley, vice-president; and Merrill C. Hamburg, secretary-treasurer.

The first general session of the nineteenth annual convention of the American Industrial Arts Association was held at 2:00 p.m., on Wednesday, April 24, at the Little Theatre, Municipal Auditorium, Kansas City, Mo.

President Roy A. Radtke presided, and Ivan Hostetler was the chairman.

The address, "Developments Affecting Education in America," was given by Dr. Lindley J. Stiles. Another general session was held at 7:30 p.m., the theme of which was "Implications for Industrial Arts Education."

The main address was given by John A. Fuzak. At the conclusion of his speech, six discussion groups were formed to consider the following questions: "Specific Things That Are Being Done by Industrial Arts Teachers to Adjust Their Programs to Recent Developments Affecting Education," "What Specific Developments in Industrial Arts Are Needed at the College Level," "What Contributions Industrial Arts Make Toward the Increased Demand for Technicians in Industry," "Implementing and Correlating Industrial Arts in the Total School Curriculum," "Increased Enrollment and Its Effect on the Industrial Arts Program in the Secondary

(Continued on page 8A)

PARKS PLANERS Give Your Students
Practical Experience on Popular Industrial Machines

Students learning on Parks Planers benefit not only from the safe, easy, and accurate operation of these planers, but also from the practical experience of working on the same type of high-speed, precision built planers they will eventually use in their trade. The Parks No. 20, 20" Planer (at right) has a 4-knife cutter-head with a speed of 3600 R. P. M. and offers two feed speeds—20 and 40 F. P. M. or 40 and 80 F. P. M. Available with knife-grinding attachment at additional cost.

THE **PARKS** No. 20
20" Thickness PLANER
WITH KNIFE-GRINDING ATTACHMENT

THE **PARKS** HEAVY-DUTY
12" Thickness PLANER

At left is the Parks Heavy-Duty 12" x 4" Planer—a compact, sturdy thickness planer with feed speed of 16 F. P. M. at 4000 R. P. M. Will handle material as short as 6" and as thin as 1/4". Both planers are priced low enough for even the most modest shop budget. WRITE FOR COMPLETE DESCRIPTIVE LITERATURE.

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MANUFACTURERS OF QUALITY WOODWORKING MACHINES SINCE 1887

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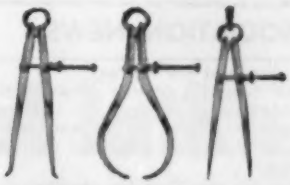
These tools are basic in any well-equipped school shop. They won't put a bulge in your budget but they will give your boys the invaluable experience of working with genuine Starrett Tools. For other Starrett Tools recommended for school shop use, see new Starrett Catalog No. 27.

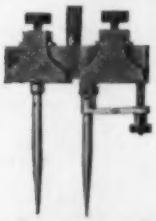


STARRETT "YANKEE" CALIPERS AND DIVIDERS
No. 73 No. 79 No. 83

Spring-type, side-adjusting inside and outside calipers and dividers made of high grade steel — strong, durable, well finished. Many other types available.

NO. 436 0-1" SATIN CHROME MICROMETER

Ruggedly built with new tapered frame plus no-glare, rust and stain resisting Satin Chrome Finish on sleeve and thimble, easy-to-clean black enameled frame, quick-reading figures, decimal equivalents on thimble.

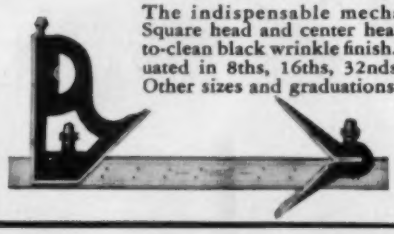


NO. 50A IMPROVED TRAMMELS

Make your own beam of any length for these improved trammel heads. Two heads furnished (one fine-adjusting) plus socket for replacing either steel point with pencil. Use with any 3/8" x 3/4" beam.

NO. 11 12" COMBINATION SQUARE

The indispensable mechanics' tool. Square head and center head have easy-to-clean black wrinkle finish. Blade graduated in 8ths, 16ths, 32nds and 64ths. Other sizes and graduations available.

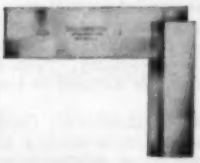


NO. 129 BENCH BLOCK

An excellent bench block and light anvil for heading, drilling, pin driving, etc. Hardened and ground to smooth finish with knurled side grip. Holes range from 1/8 to 5/8 inches. Size: 3" diameter by 1-1/2" high.

NO. 172A THICKNESS GAGE

One of a wide choice of types and leaf combinations. Made of the finest steel ground velvet smooth. Nine 1/2" x 3-1/16" leaves from .0015" to .015". Locking devices secure blades in any position. Straight or tapered leaves (shown).



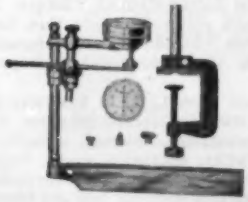
NO. 20 HARDENED STEEL SQUARE

A precision square with beam and blade hardened and ground to insure parallelism and straightness. Blade sizes from 1-1/2" to 36".

FREE EDUCATIONAL AIDS

New Bulletin 1203, "How to Read, Use Care for Micrometers and Vernier Gages." Also, "Training Aids Bulletin No. 1202" which shows many Starrett training aids available free or at small cost.

NO. 196A UNIVERSAL DIAL TEST INDICATOR



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ASSOCIATION NEWS

(Continued from page 6A)

School With Emphasis on the Junior High School," and "Standards, Codes of Practice, Ethics in Industrial Arts That Remain True Despite Social, Economic, and Other Changes in our Culture."

The theme for the Thursday morning deliberations was "Technological Developments."

G. Harold Silvius was the chairman.

Ernest L. Minelli spoke on "What Is Automation." Dewey F. Barich presented the topic "Selected Industrial Practices and Developments and Implications for Industrial Arts."

In the discussion groups the following subjects were taken up: "What About Accepted Aims for Industrial Arts in the Light of the Twentieth Century Technological Developments," "What About the Content for Industrial Arts in the Light of the Twentieth Century Technological Developments," "What About the Methods for Teaching Industrial Arts in the Light of Twentieth Century Technological Development," "What About Evaluation Procedures for Industrial Arts in the Light of Twentieth Century Technological Developments," and "What About the Physical Plant for Industrial Arts in the Light of the Twentieth Century of Theological Developments?"

The American Industrial Arts Association business meeting was held on Thursday afternoon at 1:00, at which time resolutions of thanks were passed to the administration and personnel of the public schools of Kansas City, Mo., and Kansas City, Kans.; the management of the Municipal Auditorium and Hotel Muehlebach, Kansas City, Mo.; the program chairman Dr. Ivan Hostetler for the fine job he performed; to J. Ely Van Hart, Robert Hough, and L. E. Falgren for their excellent work with the exhibits and exhibitors; to Dr. and Mrs. Kenneth W. Brown for their services; to the Ship; the U. S. Office of Education; and the officers of the National Education Association.

Boston has been selected for the 1958 convention city and G. Wesley Ketcham, Hartford, Conn., and James Hammond, Fitchburg, Mass., have been appointed cochairmen of the general convention committee.

The 1959 convention will be held at Cincinnati, and the 1960 meeting will be held at Toronto, Canada.

At the meeting held Thursday at 2:00 p.m., the theme of learning and behavior were discussed.

William J. Micheels was the chairman, and Robert D. Brown spoke on "Evolving Concepts of Learning." Gerhardt W. Neubauer spoke on the subject, "Implications for the Teaching of Industrial Arts."

The discussion groups then took up the following topics: "Learning About a Technological Society," "Learning Motor Skills," "Learning About Industry, Its Products and Processes," and "Learning Attitudes in the Industrial-Arts Shop."

At the evening meeting Thursday, Verne L. Pickens acted as chairman.

The theme of the meeting was "Changes in Home and Family Living."

Kenneth F. Perry did a superb job in his talk on "We Are Always Right."

The discussion groups then took up the following subjects: "Implications for Industrial Arts in the Do-It-Yourself Movement," "Consumer Literacy and Its Challenge to Industrial Arts," "Industrial Arts and the Wise Use of the Increased Leisure," "Improved Use of Electricity in the Home through Industrial Arts," and "Preparing Industrial-arts Teachers Who Can Promote Better Family Living."

At the Friday morning session, Robert L. Thompson was chairman. The theme of this meeting was "World Situation and Its Influence on Education."

Dr. H. H. London spoke on this topic after which the group discussions took up the following subjects: "How Can Industrial Arts Contribute to International Education and Improve World Conditions," "How Can Industrial Arts Contribute to Technical Education," "The Role of Industry and Communications," "A New Look at Aims and Objectives in Industrial Arts in Terms of the World Situation," "Recruitment and Retention of Industrial Arts Teachers in the Face of Competition from Industry," "The Impact of Technical Training in Relation to Industrial Arts."

Friday morning at 10:00 a.m., Gordon H. Fallesen was chairman at a meeting specially devoted to the subject of safety education in industrial arts.

The speaker on this occasion was Wayne P. Hughes, director, School and College Division, National Safety Council, Chicago, Ill.

The panel and group discussion then took up the question "Should Driver Education Be Taught in the Industrial-Arts Department?"

The afternoon from 12:00 to 5:00 was devoted to a student conducted program. The activities demonstrated covered agriculture, metalwork, plastics, electricity, crafts, finishing, printing, ceramics, copper enameling, leatherwork, teaching methods and demonstrations of electronic circuits, color anodizing of aluminum, and art metalwork and design.

At 2:30 p.m., Kermit A. Seefeld conducted a general session, the theme of which was

(Continued on page 14A)

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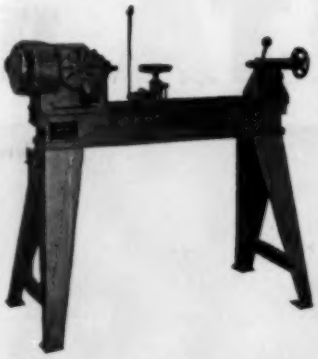

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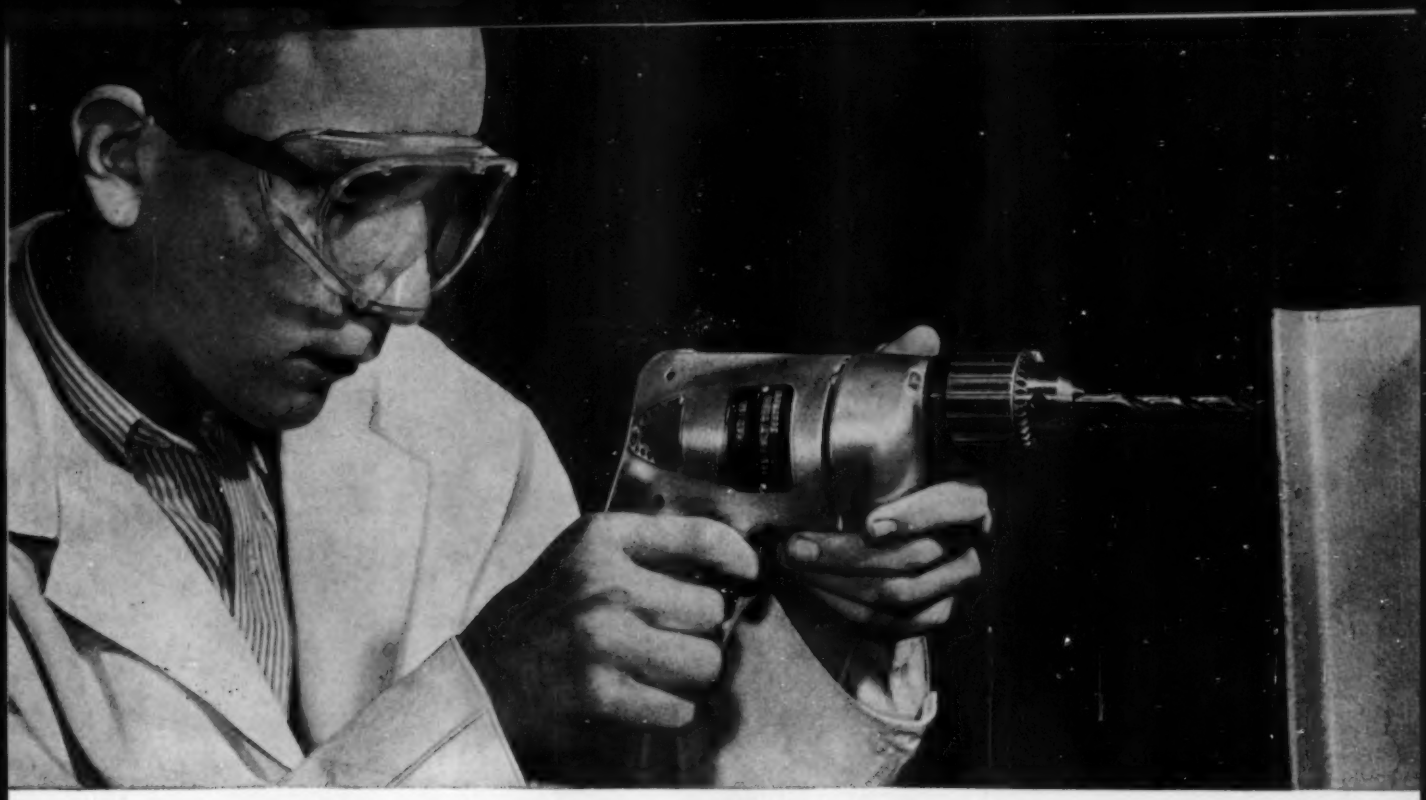

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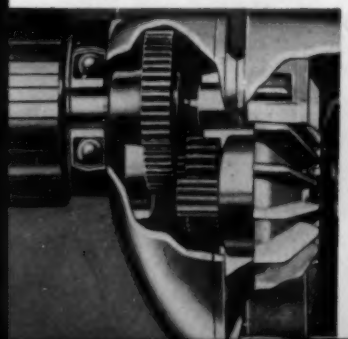

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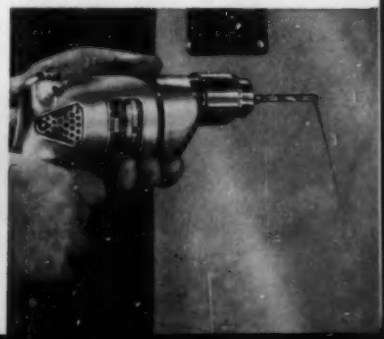

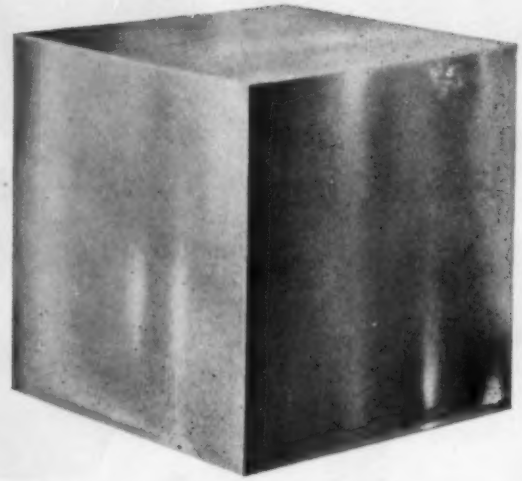

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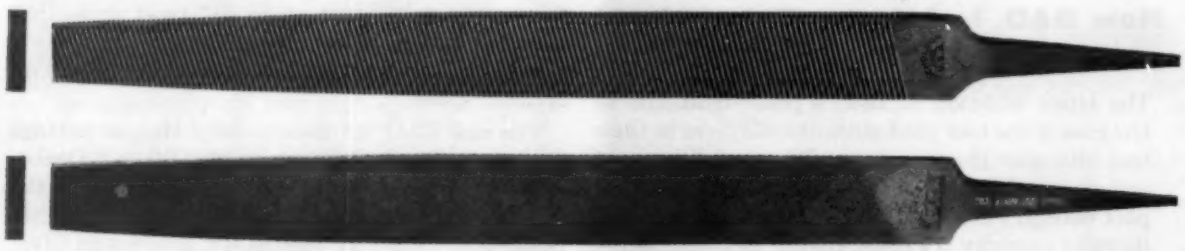

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Industrial Arts and Vocational Education
The Shop Teachers' Professional Magazine
JUNE 1957

Automation and Vocational Education

H. ROBERT KINKER
Indiana University
School of Education
Bloomington, Ind.

Automation, a term which cannot yet be found in even the newest standard dictionary or thesaurus, is nevertheless creating varying degrees of uneasiness — and not infrequently outright concern — in the minds of some members of labor, management, and personnel groups as well as the lay public. The immediate causes for this concern arise from a spate of vague rumors, ill-founded conjectures, only half understood information, and pessimistic predictions that followed closely upon the introduction of this latest industrial phenomenon.

Automation a Threat or a Boon?

Toward the end of 1954 a few prominent labor leaders foresaw automation as a threat that would inevitably eventuate in widespread unemployment, especially among older workers, women, and minority groups in the mass production industries. To offset this situation they began hinting that management would be well advised to consider seriously the adoption of the 30-hour work week, a form of spread-the-work reminiscent of the 1930's, while maintaining wage rates at current levels. Conversely, certain perhaps overly optimistic management representatives ridiculed the idea that automation potentially tended to create unemployment and they insisted that, on the contrary, it promised the realization of the constantly recurring American dream, "the good life for everyone." Significantly, they failed to indicate exactly how it was to be achieved.

Between these extreme opinions and predictions were large numbers of persons in both the management and labor groups who were uncertain about what to believe. At the moment, the last quarter of 1956, any fears which they may have experienced seem to have no immediate justification. With over 66,000,000 persons employed and only 2,500,000 out of jobs — many are not employable or are not seeking work — the dire forebodings of the past year or two seem as baseless as last night's bad dream in this morning's bright sunlight.

Claims and Counterclaims

Before attempting an analysis of the manifold claims and counterclaims, it is essential to understand what is meant by this technique called automation. Specifically what is it? At the risk of oversimplification, it is the application of electronic, hydraulic, and pneumatic devices to power machines in order to control automatically the quality and quantity of their output. The workers who man these machines are no longer required to engage extensively in the manipulative process or to test the resulting product. In other words, production machines have been given *brains*.

These brains, or controls, sample the workpiece while it is in process and either accept it or reject it. Even further, the *brain* can *order* the necessary correction so that the piece following the one which was rejected will adhere to the standards which were originally established. The brains might almost be said to think, though actually they are merely carrying out the directions which they previously received by means of punch cards or magnetic tapes.

Initially everything that man produced resulted from the physical, and perhaps mental, effort that he exerted. Production, such as it was, involved almost pure muscle power. Then, gradually, he learned to apply outside sources of power to his own exertions, thereby reducing his physical effort and postponing the onset of exhaustion. At first he used only crude tools and simple mechanical devices, but they enabled him to transfer a portion of the burden from his own back to that of the machines, elementary though they were. Subsequently more and more of the burden was transferred until, eventually, there was a substantial increase in productivity and a corresponding reduction of physical effort. Thus dawned the Industrial Revolution, first in England and then, almost a hundred years later, in the United States where ulti-

mately it reached a higher level of efficiency than anywhere else in the world.

As man slowly and painfully added to his store of knowledge he learned how to design and build more advanced machine tools. From a simple lathe restricted to a few simple operations, for example, he progressed to the turret lathe which was capable of being *tooled* for a series of related operations. This required only a minimum of physical exertion in shifting from one to another of the successive machine processes. Other machine tools likewise underwent similar improvements in design and utility.

Automatic Machinery

Then came the *automatics*, those machine tools that are capable of performing more than one operation in a cycle without any intervening manual manipulation on the part of the operator. These automatics are, in fact, capable of performing an entire cycle of sequential operations — and of repeating the cycle indefinitely — once they have been set up for a predetermined, multi-operational process. The operator needs only to keep them *fed* with a sufficient amount of suitable material. Anyone who has ever seen an automatic taking in bar stock at one end, for example, and turning out hundreds of machine screws at the other end understands, at least in part, the operation of the automatics which are so numerous in the mass production industries.

The example just cited represents one of the simpler kinds of automatic machines. Many others, of course, are much more complex in their function.

Automatic Machines Lead to Automated Machines

From the automatic machines to the automated machines was only a step, although admittedly a long one. It was made possible through the invention and perfection of the photoelectric cell, the so-called *electric eye*, together with the development and utilization of magnetic tapes, punch cards, servo mechanisms, and the printed circuit. This latter is an electric circuit without the bulky wiring of the more conventional type. It is literally an electric conductor that is impressed in liquid form on material suited to receive it, much as ink is printed on a newspaper or magazine. Electric impulses will follow such a circuit as readily as they will the ordinary wire circuit. The chief advantages are a substantial reduction in the amount of space required to install such a circuit and a material saving in cost.

These scientific advances, in conjunction with more familiar devices, form the electronic controls which govern automated machines. Through their use industry now finds it possible to expand once again its production horizons and add significantly to existing standards of living. This may not, however, be an altogether unmixed blessing. On the contrary, as has already been suggested, a number of perplexing problems now confront management, labor, personnel workers, and vocational educators.

The complexity of these problems, the primary factor in retarding their early solution, arises from a lack of understanding regarding their many facets. This is almost as true of those persons who are most intimately associated with the problems as with the lay groups that will be directly or indirectly affected by the solution. As a case in point, Norbert Weiner, the eminent mathematics professor at M. I. T. and a pioneer in the development of automated machines, originally predicted that this technological phenomenon would ultimately reduce most wage earners to the status of slave laborers. He has since revised this gloomy point of view and now contends that automation is not only increasing man's leisure, but enriching his spiritual life. Since Weiner cites no scientific evidence, however, this current belief on his part may be no more valid than his original promulgation.

Still another example of the current confusion may be found in much of what has been published, by prolific but somewhat questionable sources, about the future peacetime uses of automation. Much of this material, especially in the feature articles, takes on the coloration of some of the less reputable science fiction. Irresponsible hacks writing for some of the more lurid segments of the public press have depicted automation as leading directly to the advent of the *automatic factory*. Some have even solemnly cited supposed examples of such factories — vaguely located in some remote sections of the country — busily engaged in endless production with no workers in attendance, or at least not more than a handful. There is, of course, an awesomeness about such a phenomenon that captures the imagination of the more gullible readers. The shocking power produces the same effect upon the imagination of some adults that the reading of ghost stories generates in the minds of some children.

Employers and Employees Worried

Labor officials, too, are perturbed over the potential impact of automation upon employment, especially in the mass production industries. This concern arises from the prospect of technological unemployment for certain types and classes of workers, though at the moment no one can accurately presage the direction, extent or severity. This much seems certain, however: *Some unemployment will occur in the wake of automation.*

It has been pointed out by authorities — labor officials and economists — that any substantial increase in productive efficiency must be accompanied by a corresponding expansion in market outlets or it will inevitably eventuate in a reduction in the work force. Since automation dramatically increases productive output, and assuming no comparable increase in product distribution, a reduction in the work force is not only possible but imperative. Indeed, any other alternative, in the light of the conditions just set forth, is neither practical nor profitable.

Perhaps one of the most significant examples of this point is the situation which developed in industry between November, 1953 and November, 1954. Although industrial output was exactly the same in both months, approximately 1,000,000 industrial workers lost their jobs during the intervening period. The reason? Productivity of workers had increased by 5 per cent and only 16,000,000 workers were required to produce the same amount of goods that it had required 17,000,000 workers to turn out a year earlier.

In an expanding economy, such as the one now prevailing, a period of unemployment may cause only relative inconvenience for many of the discharged workers. For some of them it will be temporary, lasting only until they have acquired the additional training essential for effective performance of the more complex jobs which will then be open to them. For other workers, however, unemployment will be permanent so far as the likelihood of securing future work comparable to that in which they previously were engaged is concerned. These latter individuals will consist, for the most part, of women, Negroes, unskilled workers, certain types of semiskilled workers, and workers over 45 years of age.

The first and the last of the groups just listed — women and workers over 45 years of age — frequently are not considered good prospects for advanced technical training such as is required for competency in automated jobs. Employers realize that many women workers do not regard their jobs as careers. Employment for them is more or less temporary in nature, lasting only until they and their husbands have attained a previously determined economic status or until pregnancy ensues. Underwriting the cost of a technical program for women is not, in altogether too many instances, a profitable investment for employers.

The Question of the Older Workers

In the case of older workers there are several reasons why employers are reluctant to regard them as good training prospects. As a group, the older workers have less formal education than the youngsters now entering the work force and thus may not easily be retrainable. Then, too, older workers have a shorter work potential in terms of the number of years before retirement, and employers are vitally interested in maintaining a predetermined ratio between older and younger workers.

Logically the older workers would seem to be especially desirable employment prospects. Automated jobs require considerably less physical effort on the part of the operatives. With these strains ameliorated, it would appear that many of the older workers would be particularly desirable choices for employment. Then, too, older workers as a group are probably more dependable and less subject to distracting influences. This is especially important in automated jobs since closer attention is required for the increased amounts of costly and complicated equipment now under the control of individual workers. Despite the logic, however, far too many employers are still reluctant to employ, train, retain, or retrain older workers.

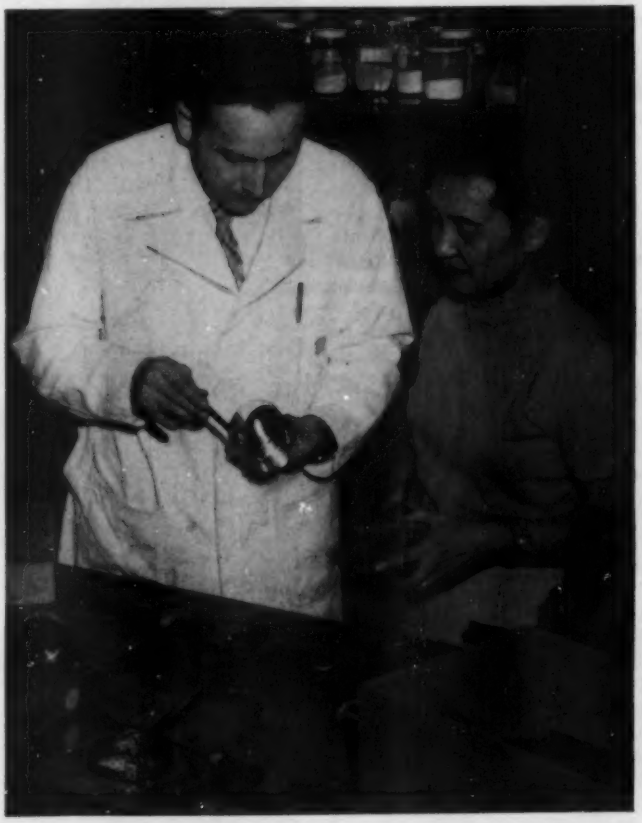
There is still another factor which operates to the disadvantage of older workers in the matter of retraining and subsequent upgrading. All training programs initially add to the cost of operation, although it may perhaps be demonstrated that eventually the savings which are effected because of the reduction in damaged materials and equipment, plus the increase in production, actually result in lower unit costs. Nevertheless management will not willingly train workers if it can be assured of an adequate supply from other sources. Many employers have now discovered that training costs can be partially or wholly eliminated through the employment of workers who have received a portion of their preparatory technical training in the vocational trade and industrial programs available in many of the public secondary schools of the nation. These preparatory preemployment programs, supplemented by advanced trade extension courses following employment, provide many an employer with a dependable source of technically competent *young* workers. Thus the cost of the training is shifted from the employer to the local community, the state, and the nation.

This is in no sense a criticism of vocational education programs. On the contrary, they are a vital and an integral part of the total educational offerings available to American youth and adults. Even more important, they constitute a fundamental bulwark against any authoritarian power that may entertain hostile intentions toward this nation. This is best substantiated by the fact that just prior to, and during, World War II over 11,000,000 Americans were trained to work in the industrial plants engaged in turning out materials of war for the armed forces. In a world that is probably condemned for untold future years to an uneasy peace, the need for highly skilled workers — and thus for publicly supported vocational education programs that train them — will certainly be no less than during the decade and a half just past.

And even though the world does not once again burst into flames, in either the immediate or the distant future, the need will still remain for an adequate supply of skilled workers to man the production facilities of this highly industrialized nation. In the wake of even further industrialization, and with a corresponding increase in automation, the facts seem to warrant the prediction of a continuing demand not only for more skilled workers, but for more highly skilled workers. This will be particularly true among such workers as electricians, electronics technicians, machinists, tool and die makers, instrument maintenance men, and similarly highly specialized personnel.

Furthermore, on the basis of experiences gained thus far in the use of automated equipment, there will undoubtedly be a continuing demand for more versatility among skilled workers. This does not mean that their traditional skills will become less specialized; on the contrary, the scope of such skills will need to be both broadened and deepened. In other words, the present skill boundaries of certain of the highly specialized trades will not be blurred or broken down, but they will be moved farther apart so that eventually they will include some advanced manipulative processes and complex related technical knowledges not now considered to be within their province.

The implications of automation with respect to training, employment, reten-



Mrs. Boon Chawee, a graduate student in the industrial-arts department at Ball State Teachers College, Muncie, Ind., is pictured receiving instructions in an arts and crafts course. Upon returning home Mrs. Chawee will resume the position as an elementary supervisor in Bangkoknor, Dhonburi, Thailand

Submitted by Bernard R. Josif, department of industrial arts, Ball State Teachers College, Muncie, Ind.

tion, advancement, retraining, or separation are fairly apparent to a few farsighted management and union officials. These same implications are perhaps somewhat more obscure to some vocational educators, especially in connection with occupational choice of students, selection of appropriately qualified trainees, and functioning course content. For the most part these latter individuals have been so deeply engrossed in current program operation that they have had little time to devote to emerging problems. Such action cannot much longer be delayed, however.

The Need for Reappraising Vocational Programs

All vocational educators, but most particularly those in the trade and industrial area, must shortly engage in a realistic reappraisal of existing programs. Actually, they should be doing the evaluation *now*. Out of such an evaluation, assuming that appropriate criteria are utilized, there should come the kinds of data that will be of assistance in the solution of these problems which are growing in importance and urgency. For example, in the revision of course content, it is important for vocational educators to know precisely what skills and knowledges are required by persons who are now, or who will be in the near future, employed in fields involving automation. It is equally essential to determine whether any of the skills and knowledges now imparted are no longer functional and should, therefore, be eliminated from future course content.

It is likewise vital, in the process of reappraisal, to determine on the basis of fact, rather than opinion or emotion, what kinds of persons may appropriately be admitted to training for future employment in automated occupations. For altogether too many decades vocational educators have unanimously condemned the practice — on the part of too many general educators — of consigning to vocational programs all those students who for one reason or another do not readily accommodate themselves to traditional secondary school curricula. While the criticism is demonstrably justified, it must nevertheless be pointed out that vocational educators have not provided their general education colleagues with any selective criteria. Here, then, is an opportunity, and an obligation, to establish a set of *specifications* which may be employed effectively in the selection of those individuals for whom training is appropriate. Now is the time to implement the phrase " . . . for all those who need, want, and can profit from the instruction."

Nor should this evaluation be restricted to in-school youth and the day trade programs. Both the trade extention and the apprenticeship course content are in need of reappraisal, too, with the latter in special need of attention. Viewed objectively, it is extremely difficult to justify the continued retention of certain content items in some existing apprenticeship programs. By any reasonable criteria some of these items are technologically obsolescent and ought to be eliminated. In fact, it may respectfully be suggested that the entire apprenticeship program needs to be reviewed, not only in terms of technological appropriateness of content but in terms of time as well as areas of emphasis.

It would seem, then, if the foregoing premises can be supported with evidence, that the implications of automation demand the closest kind of consultation and co-operation between management and union officials on the one side and vocational educators on the other. Present and future problems resulting from the spread of automation will not be solved by any one of these groups working in isolation. What better time than now when industry is standing on the threshhold of the *automated age?*

BIBLIOGRAPHY

National Conference on Automation, *The Challenge of Automation* (Washington: Public Affairs Press, 1955).

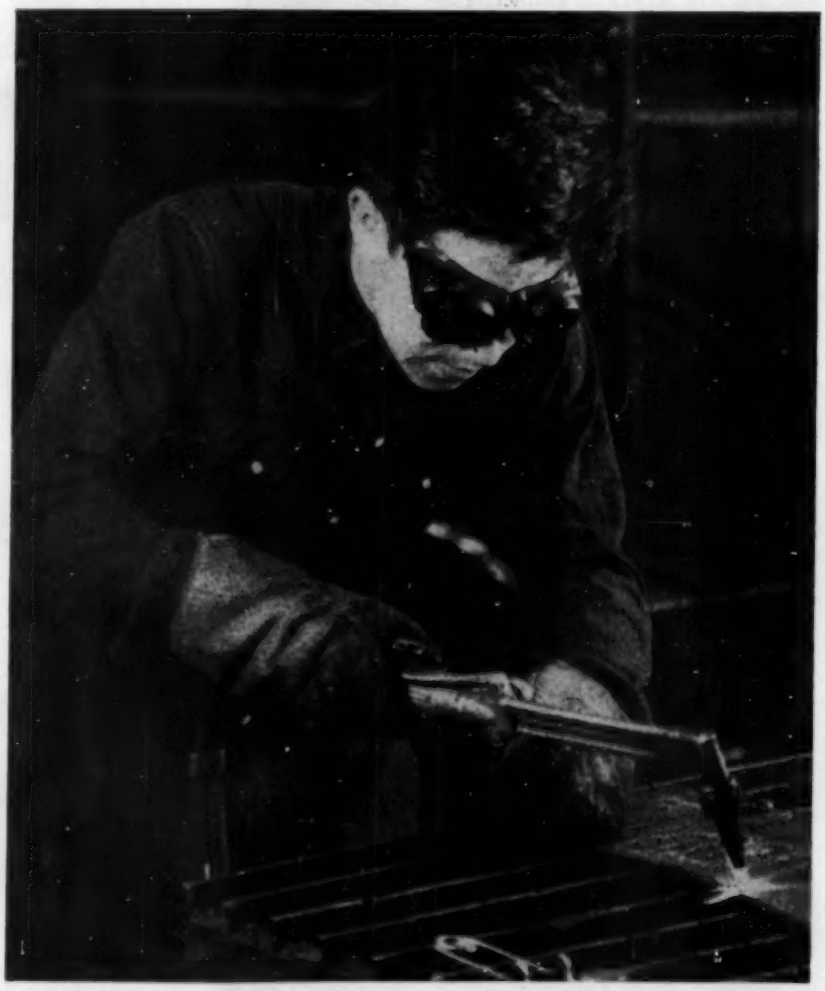
Weiner, Norbert, *The Human Use of Human Beings — Cybernetics and Society* (New York: Doubleday and Company, Inc., 1954).

Automation, Pamphlet No. 270, Congress of Industrial Organizations, Department of Education and Research, Washington, 1955.

Stern, James, *Possible Effect of Automation on Older Workers*, U.A.W. — C.I.O., Michigan.

Bright, James R, "How to Evaluate Automation," *Harvard Business Review*, Vol. 33, No. 4, 1955.

"Push-button Labor," *Fortune*, Vol. 50, 1954.



This illustration proves that a picture of a man or boy really working at almost any kind of a job can be a work of art. The boy shown is Joe Lopez, a vocational welding student. His instructor is B. E. Douglass. The photograph was taken by Carl Kendricks. It was submitted by the teacher of photography, Harry A. Goldstein, Graphic Arts Department, Tucson High School, Tucson, Ariz.

A Foundry in the General Shop

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and
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Any high school industrial-arts shop offering a general metals course of the general shop type course which includes a metal area might well be considered incomplete if foundry experiences are not included.

Before foundry was added to the shop curriculum at Centralia, Mo., high school, we considered its relative importance in our industrial society, teaching possibilities, project appeal, and of course, costs of equipment and material.

Certainly foundry is a basic industry. Our automobiles, airplanes, heavy machinery, many tools and other commonly used articles depend to a great extent on foundries. How many of us realize, for instance, that the water we use in our homes flows through a faucet that was cast in a foundry?

Nonferrous foundry processes and tools for the school shop are relatively simple. Yet, they are closely correlated with the tools and processes of industry as the accompanying pictures, taken in the Centralia High School Shop and the A. B. Chance Company Foundry, clearly show. Actually, the small school shop on a limited budget can probably come closer to simulating industrial methods in this area than in any other.

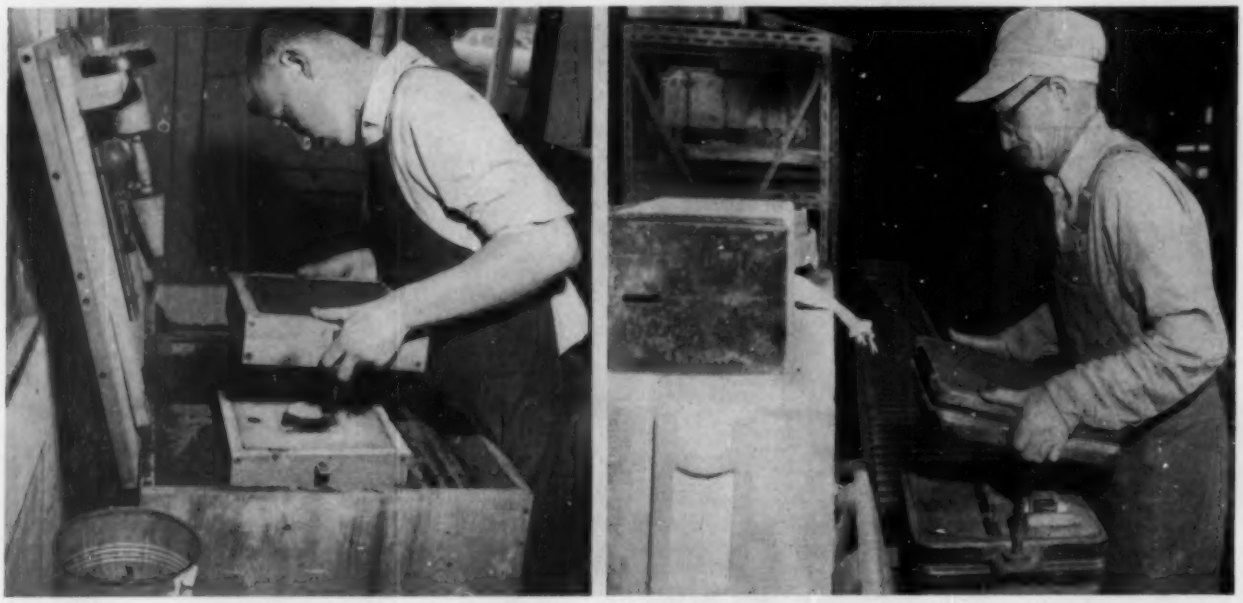
Any instructor contemplating adding foundry to his shop curriculum would have no difficulty in obtaining information on foundry practices. Aside from the usual textbooks available, further information can be obtained from foundry societies in the area — addresses can be obtained from local foundrymen. Local foundrymen can also offer much technical assistance.

Projects are certainly not without "boy appeal" and are limited only by imagination. Book ends, trivets, ash trays, plaques, are a few possibilities. The name of the local high school, placed on the pattern with raised letters, will do wonders in boosting pupil interest. This type of project also has value to the school public relations program as the project immediately becomes a souvenir. The first question usually asked by a person viewing the completed project is, "Where did you get it?" Imagine the pride of the boy as he explains to his elders that he made it himself in the school shop!

Teaching possibilities, like projects, are practically unlimited. As the student works with the various tools, processes and materials of foundry, melting points, expansion and contraction, and other properties of metals become more meaningful to him.

We found that the cost of starting a foundry unit in our shop need not be high. Many schools are successfully

Figs. 1A and 1B. Ramming or packing or molding sand around the pattern in a flask or form
All pictures, courtesy of A. B. Chance Company, Centralia, Mo.



Figs. 2A and 2B. Closing of flask after pattern is removed and runners are formed for metal flow.
See Fig. 3B on page 182

melting aluminum with small three-burner bench furnaces of the type commonly used for soldering. It works in our shop, too. Most of the tools and the molding bench were made in our shop. This left the molding sand and metal for castings as the only major items. We got our sand from a local foundry, but enough for a small shop can be purchased for about $15. Cost of the metal, of course, varies with the type chosen. Our setup, adequate for 25 students, requires only 60 square feet of floor space.

Often, a local foundry will furnish a supply of molding sand, scrap metal, and other necessary supplies at little or no cost to the school if the management is aware of the industrial-arts program. Most industrial leaders recognize the values of a sound industrial-arts program and are willing to help support such a program if they are at all able. Certainly this possibility should not be overlooked, both from the cost standpoint and also from the standpoint of possible technical assistance.

Upon visiting many school shops, it would seem that much needs to be done, particularly in the smaller schools, to enrich the area of metalworking. Foundry experiences can help meet this challenge for industrial arts.

Figs. 4A and 4B. Removing casting from sand mold after metal is solidified

Fig. 5A. Sawing and filing off gates and fins in the school shop. Fig. 6A (at right). Inspecting finished castings in the school shop

Fig. 6B. Inspecting finished castings at an industrial shop. Fig. 9A (at right). Castings made by students at the high school in Centralia, Mo.

Fig. 7B. An air operated "Squeezer" used in industrial foundries. Fig. 8B. Pulling off the top half of the mold from a multiple pattern plate used in industry

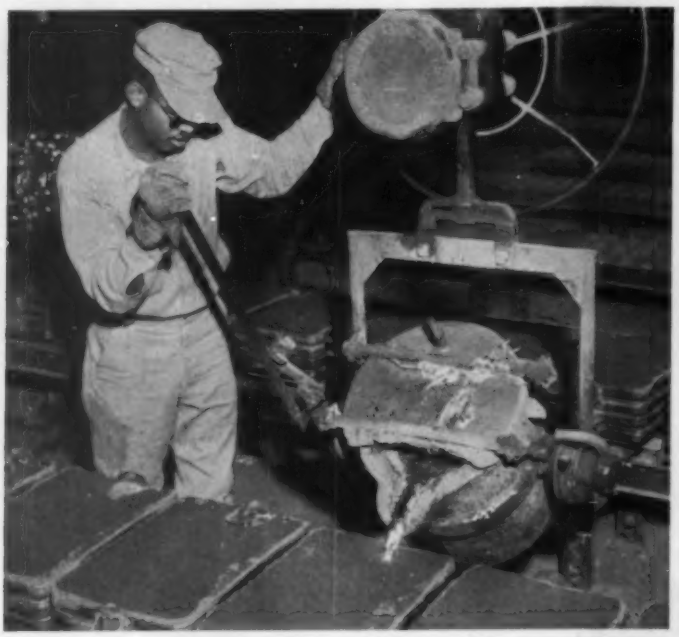


Fig. 38. Pouring aluminum 1350 deg. F. into mold cavity.
See article on page 179

Reproduction of Shop Drawings—Part III

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General Considerations in the Reproduction of Shop Drawings

Original copy or master copies must be on a transparent or translucent material such as tracing paper, tracing cloth, matte finish film, or a paper that has been satisfactorily transparentized. Drawings may be done at the outset on tracing paper or, final drawings on opaque paper may be traced on a suitable transparent material. If the original is on a good grade of reasonably thin opaque paper, such as typewriter paper or bond paper it may be transparentized to render it fit for use as an original copy from which to make reproductions.*

Time was when most drawings were made in pencil on a manila drawing paper. To reproduce these drawings one needed to trace them with India ink on a suitable translucent paper or cloth. Simply to trace the drawing alone, consumed enough time — not to mention the time lost in waiting for the ink lines to dry. The practice now, with the improvements in tracing papers, pencils, and reproduction materials, is simply to draw the original in pencil on tracing paper, cloth, or film to begin with and to reproduce it without inking. India ink still yields a much more opaque line than pencils do, yet the requirement of a presentable reproduction with good legibility can be met through pencil work only.

Since dirt or smudges on the tracing paper will block out some light during the process of reproduction and therefore show up on the print, it is well to exercise due care in the preparation of the originals.

It is sometimes desirable to prepare typewritten work for reproduction by one of these processes. Best results can be obtained when the copy is typed on a good grade of tracing paper backed up with black carbon paper so that each typed character will be intensified by the carbon deposit on the reverse side of the original copy.

Working with the sensitized paper need not be done in a darkroom. However, care should be exercised to keep the sensitized materials in a light tight container and to work with these materials in a room away from direct sunlight. The hands must be kept dry. The work area should be dry and clean. Care must be used to see that the sensitized paper does not come in contact with the developer prematurely.

*For information on transparentizing opaque papers see: Paterson, Grant M., "A Good Transparentizer," INDUSTRIAL ARTS AND VOCATIONAL EDUCATION, Vol. 29, Feb., 1940, p. 70; or "Transparentizing Formulas," INDUSTRIAL ARTS AND VOCATIONAL EDUCATION, Vol. 27, June, 1938, p. 260.

Forty-three different species of woods were used to panel a room at the University of Texas. All the woods were finished with three coats of white shellac, sanded, and then waxed. This preserved the natural color, grain, and texture of each specimen for comparison in botany studies. — *Shellac Information Bureau.*

On November 4, 1796, the United States signed a treaty with Tripoli, agreeing to pay $83,000 yearly to that country for protection of American commerce from piracy. The reigning Pasha relinquished his demands the 3rd of June 1805, but received $60,000 as ransom for the prisoners of the frigate *Philadelphia* which Tripolitan pirates had captured in 1803. — *Wisconsin Military District.*

Three hundred fifty clerks at the Army's Detroit tank-automotive center have been replaced by Bizmac, a mammoth electronic "brain." When stocks are low on any of 450,000 items the machine flashes a warning to buy more. — *Public Information Office.*

Quartermaster School moved to Camp Lee, Va., on October 6, 1941. — *Wisconsin Military District.*

Mid-Term and Final Reviews

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One of the many problems that will present itself in the course of the school year, is that of the review period. Many schools are organized around the two semester year. These schools allot a span of time, equal to, if not greater than the length of time given the examinations. Usually this review period lacks intrinsic motivation. If any motivation is present it is very apt to be extrinsic motivation, based on the marking system. Frequently, the teacher gains more than the students. How often does a review period end with a hoarse teacher, and a class deep in mischief, or re-living a week end. In an effort to increase the value of this review period, I tried the procedure outlined in this article.

The review period is divided into two parts or halves. During the first half, the class is divided into units of about four students. Each unit then is assigned a chapter, or topic. The units are instructed to make up a list of objective type questions, basing them on *their chapter*. In each unit the teacher designates a unit leader. The job of the unit leader is to break the unit assignment down even further, into component parts. He then assigns the parts to his team, or unit mates. The leader is required also to act as a recorder, and compile on a master sheet, the questions emanating from his unit. When the review period reaches the halfway mark, the class reassembles. Each unit leader in turn then presents the questions devised by his unit. The questions are directed to individual class members. If not answered, any member of the class may offer his answer. All unit leaders are cautioned beforehand to have the answers available, in case the class could not arrive at the correct answer.

The review proved wholly adequate. It provided the opportunity, not only to cover basic material, but also that material which might otherwise have been overlooked. The students' reaction to the review indicated unusually high interest and enthusiasm. The review method was used with machine shop, drawing, and woodworking classes. The machine shop and drawing classes both use texts, hence only a few additional reference books were required. The woodworking class is not using a single text. It was necessary to gather a number of reference books for the woodworking review.

The teacher planning and preparation for the review consists of:

1. Breaking the classes up into units, on paper.
2. Deciding which review topics to assign each unit.
3. Determine the unit leaders.
4. Gather reference books, and other necessary texts.
5. Provide materials for unit leaders (paper, etc.).

If preferred, the method of selecting the unit leader may be altered, to a more democratic system allowing each unit to select its own leader. In some classes however, it may be wiser and less time consuming for the teacher to select the leaders. Many students not only profited from the reivew, but experienced the co-operative efforts of a group striving for a common goal. For some it provided the hitherto unexplored opportunity to make use of reference materials. Still others gained insight into group leadership. All experienced the opportunity to organize subject matter into prescribed form for presentation.

There is 23 times more energy in the earth's nuclear fuel reserve than in all its conventional fuels combined. One pound of processed uranium contains the energy value of 1300 tons of coal or 230,000 gallons of fuel oil. — *Westinghouse News.*

There can be billions of different hydrocarbons in crude oil. Petroleum research men have the staggering job of finding out which of all the billions of possible hydrocarbon combinations exist in a particular sample. — *Petroleum Newsnotes.*

On October 26, 1825, the Erie Canal was officially opened. — *Wisconsin Military District.*

Upholstery work by students at Cotter High School, Winona, Minn. Sister M. Lorna, O.S.F., is the Teacher.

Industrial Arts and Vocational Education

JOHN J. METZ, Editor

THE 1957 AVA CONVENTION

THE members of the American Vocational Association are being offered a new experience in the form of a vacation convention for 1957. The time of the convention has been shifted from the usual winter season to a summer date — August 5 to 9, and the host city will be Philadelphia. This gives all members the chance to take part, whether they belong to the administrative family, or to the classroom teachers who in the past had little opportunity to attend these national conventions.

The choice of the convention city, too, is a very happy one because Philadelphia has a wealth of historical, cultural, and educational things to offer the visitor.

The membership of the AVA being composed of directors, principals, supervisors and teachers, city and state directors of industrial arts, T. and I. subjects, homemaking education, vocational education, vocational guidance, business education, vocational-agricultural, business and distributive education, co-operative and teacher education, apprentice training and adult education, will find a great deal to interest them in the convention city. As a matter of fact Philadelphia has some outstanding public and private schools in all of these subjects. Especially interesting to the members will be the Bok, Dobbins, and Mastbaum Schools, all of which show the marks of growth that are brought about when an able superintendent of schools, supported by an outstanding staff of assistants and teachers, continually strives to improve the offerings which the schools set before the youth and adults of a city.

This huge educational program is backed up and excellently supported by a gigantic number of industries producing heavy machinery down to small intricate parts for assembly into scientific instruments.

As a matter of fact, Philadelphia is the home of a larger percentage of skilled workers than many other manufacturing communities in our country.

Then it contains many reminders of our colonial days, such as Independence Hall, where the First Continental Congress met, the Liberty Bell, the house where Betsy Ross made our first flag, and many other reminders of the early days of our country. Lest we forget, that great American — Benjamin Franklin — trod the same streets the visitor will traverse when he attends the next AVA Convention.

It was in Philadelphia, too, where the Centennial Exposition of 1876 was held. The exhibits at this exposition may be said to have planted the seeds of industrial arts and vocational education, not only in this huge convention city, but throughout the entire nation.

Other items of interest are Temple University, the Spring Garden Institute founded in 1850 which helped in establishing Drexel Institute, The Williamson Trade School and the Central Manual Training School — one of the earliest of the manual-training schools. The School of Industrial Art was founded in 1877. Girard College is another educational institution worth while visiting.

Visitors at the convention will therefore have a job on their hands to wedge in all of the worthwhile things, in their all-too-short stay in this fine old city, besides attending the programs which are annually planned by the American Vocational Association for its members. No doubt there will be a few who attended the 1928 convention at Philadelphia. The visit to this city will give them an opportunity to compare the progress from then to now without finding too much to criticize about the *now* nor the *then*.

The summer convention gives many more members an opportunity to attend the educational offerings of this annual get-together. It would be a real shame to miss the opportunity. Make your hotel reservations at once. Page 55 of the January issue of the *AVA Journal* listed all of these hotels and the rates which they charge.

CLOSING UP THE SCHOOL SHOP

OF COURSE, planning for closing up the shop at the end of the school year must be done some time before the actual termination of the school term.

Some of the planning has to do with such work as cleaning up the hand and machine tools, applying rust preventatives to them, storing them away under lock and key so that there can be no pilfering during the summer months.

Then an inspection must be made of all text and reference books and pamphlets. Some of these may be repaired for use during the next year. Stock piles of wood and metals must be made. Screws and nails must be checked over and requisitions issued so that all needed material will be available when school opens in September.

All financial accounts must be brought up to date and accounted for at the office. The keys that have been in the hands of the teacher throughout the year must all be tagged and left with the teacher's summer and home address at the office so that the school can reach him during the vacation, if that should become necessary.

Attention to these duties, onerous as they may be, give a very fine indication whether a certain teacher is reliable and trustworthy. For this reason, whether you will or will not return next year to the shop which you are now closing up, do the work in such a way that it will be a credit to you.

YOUR NEW PERMANENT ADDRESS

IF YOU are an older subscriber you have read this exhortation again and again, because we publish it annually as a reminder. You will, therefore, not have to spend the time reading it. However, even you may not think of the necessity of informing our circulation department of a change of address when you accept an appointment to a new school.

Yet this information is very necessary. Unless we are properly and promptly informed, your magazine is mailed to your old address. In many cases these misdirected pieces of mail are not returned to us. Replacing the copies which you did not receive is practically impossible because the high cost of paper and printing forces us to keep our press runs down as much as possible.

May we, therefore, ask our readers to take this reminder to heart and mail their permanent 1957–58 address (not the summer address) to us as soon as practicable. With the new address, please give us your old address also, and do not forget to add the new zone number.

Poplar, the People's Tree

ORVILLE A. OAKS
Wilmette, Ill.

Populus, classical name of the poplar tree clan which includes the cottonwoods and aspens, is of obscure origin. However, according to Collingwood in "Knowing Your Trees," an early Roman expression of *arbor populi*, the people's tree, may have referred to it. The poplars, along with their close relatives the willows, comprise the Willow family, and are of ancient origin. Their remains have been discovered in rock formations millions of years old. Thus, poplars being among the first trees on earth it was only natural that the early tree worshiping Greeks and Romans should consider them sacred to their mythical gods and heroes. Academus, Greek hero of Attica, had his groves of poplar trees, and Hercules declared the poplar a sacred tree as it had once saved his life. The leaves had furnished an antidote to the poison from the bite of a venomous snake, thus making the poplar sacred to Hercules forever after. Dis, Roman God of the Underworld, had his sacred poplars too, which grew along the banks of the Acheron — the river of Woe located in Hades. Persephene, daughter of Zeus (Greek God of the Heavens), and wife of Pluto (the Roman God of Hades), also considered the poplar a sacred tree. Zeus himself was born and reared under a poplar tree on the Island of Crete in the Aegean Sea.

The aspen, one member of the poplar family, has leaves that tremble constantly. This came about, according to early Christian legends, when Jesus was crucified on a cross made of aspen wood. The sacred blood gushed upon the cross when the nails were driven into His feet and hands, causing all the aspen trees to shudder or tremble in shame. They have been trembling ever since.

The Poplar and Our Indians

Our American Indians had never heard of the Greeks and Romans, nor of Jesus and the cross, until the coming of the white man. Yet, various members of the poplar tree family, such as the cottonwood and aspen, were held in reverence, and thought to be sacred, by many Indian tribes. The Plains Indians of the Missouri River basin especially (Omaha, Ponca, Pawnee, Dakota, Teton, Nebraska, Kiowa, and Hidatsa), gave to the cottonwood a mystic character or near sacredness all its own. They lived in constant association with it, finding it growing everywhere, "always so self-reliant, showing such prodigious fecundity, its lustrous young leaves in springtime by their sheen and by their restlessness reflecting the splendor of the sun like dancing ripples of a lake." The leaves of the cottonwood, like those of the aspen, regardless of how still the air, seemed to be in constant motion. Even when all else was quiet on hot summer afternoons, and at night, the Indians could hear the leaves rustling as an occasional gentle breeze drifted through the treetops. Thus the cottonwood, in time, began to take on a character of its own, and eventually acquired a place in their religious thoughts and action.

The Hidatsa believed the cottonwood, largest tree in the upper Missouri River valley, had its own *shade* or spirit. This *shade*, since it possessed intelligence, could offer aid and comfort in various undertakings if properly approached. When misfortunes overtook the tribe the old men declared it was because the shade or rights of the cottonwood had been disregarded. According to some folk tales, the very old people of the Western Washington claimed this tree "had a life of its own because it shook itself when there was no wind." Thus they refused to use it even for firewood.

The Sacred Pole of the Omaha and Ponca was made of cottonwood. According to one legend the people were very poor as they had no chief to guide them. While a council of the various tribes was being held, a wandering young brave came in declaring he had found a wonderful tree. The thunderbirds — sacred to many Indian tribes — were coming and going, leaving trails of fire in the burnt grass pointing to the four winds, North, South, East, and West. As the thunderbirds lit upon the tree it would burst into flame, but remain standing unharmed. It was, however, not possible to see the fire except at night. That very night the young braves of the tribes ran for the tree and cut it down and carried it back to their village where a sacred tent was made to keep it in. Eventually the people began to pray to the Sacred Pole for courage and for trophies in war and in the hunt. Each year, after the summer buffalo hunt a big religious ceremony was held celebrating their successful hunting. Everyone took part, some offering presents to the Sacred Cottonwood Pole before it was finally anointed. A sham battle followed this ceremony, after which the Pole was placed in its sacred tent until another summer hunt, and the tribes returned to their villages.

The Sacred Cottonwood Pole of the Omaha-Ponca is now on permanent exhibition in the Peabody Museum at Harvard University, Cambridge, Mass. The Pole is about 8 feet long by 2½ inches in diameter, and is covered with bark for about four feet, both ends being bare.

The Omaha name for the cottonwood was *Maa-zho* or cotton tree, and they called the Little Blue River where they hunted *Maa-ozhi-ke*, or river full of cotton trees.

Other Plains tribes, such as the Arapho, Cheyenne, and Comanche, also paid homage to the revered cottonwood as it was the most characteristic tree in the nearly treeless and arid regions between the Rocky and the Sierra Mountains. Since the cottonwood always grew along the few streams and other moist places, it led these tribes to a never failing source of water, either on or near the surface of the ground. Thus it was natural for them to hold their Ghost Dance, a religious ceremony, among the cottonwoods. The Arapho had a song in honor of the cottonwood, and the Thompson of Brit-

ish Columbia in Canada held ceremonies before and after gathering the fruits and roots of the cottonwood. They desired by the former ceremonies to insure and increase the productivity of the tree, and by the latter to offer thanksgiving for a bountiful crop. They also made an ointment from the bark which they rubbed on their bodies during their purification rites. Some performers in the Snake Dances, religious ceremonies held just before sunset by the Hopi's of Arizona, wore a coronet of cottonwood on their heads. Others used cottonwood leaves or a cottonwood bower during the ceremonies, which usually lasted 20 days. The Zuni's of New Mexico in preparing offering to the Sun Father, the Moon Mother, and the gods of their ancestors, used the slender twigs of the cottonwood in such ceremonies.

The various members of the Sacred Poplar tree family not only served the ancient Greeks, Romans, and our Plains Indians spiritually, but also helped to make the Indians' daily living more comfortable. In the spring the milky juice, found just under the bark of the poplar, furnished them with a sweet drink of which they were very fond. They also ate the inner bark of young sprouts for its sweet taste as well as for food. Their ponies, too, were fond of the young cottonwood branches, and in times of grass shortage due to prairie fires or drought, turned to eating the branches of the older trees. White travelers and trappers vouched for the food value of the cottonwood as fodder for their own horses. In extreme cases the Indians, themselves, were forced to sustain life in the same way. Winter camps were made under the same cottonwood trees year after year, not only for the protection they afforded, but because the cottonwoods were along or near a source of water.

The Kiowa name for the poplar was *A-heen* or principal tree, a fitting name too, as indeed it was their principal tree economically. It furnished the poles for building their summer homes or arbors, and gave them fuel for cooking and for their tepees during the long winter months. The poplar made an excellent fuel as it threw no sparks to set their tepees on fire. They also made a mucilage from the bark for combating scurvy. Their smoke sticks which the present-day Kiowa use in their sacramental peyote ceremony, as well as the poles for the tepee in which the ceremony is held, are made of their *A-heen* or principal tree. The peyote ceremony is carried on at the present time by many Indian tribes and consists of eating the Mescal Button, the fruit of a special cactus which contains a powerful but apparently harmless narcotic.

In the old days before the coming of the white man the Omaha and Nebraska too, made much use of their *Maa-zho*, the cotton tree. Its bark gave them fuel for roasting clays from which they made their paints, used for heraldic and symbolic painting of their bodies. The spring leaf buds and seed pods boiled in water, furnished a yellow dye for coloring their feathers to plume their arrows. Their children used the cottony fruits as chewing gum, and made toy moccasins from leaves, as well as toy tepees. The tepees were made in large numbers and placed in circles like the circular camps of their elders. The green unopen fruits of the poplar or cotton tree furnished them beads ond earrings for their play. The older girls and young women made sweet flute or birdlike notes by holding the poplar leaves between their lips and nose and blowing. The Pima Indians of Arizona used poles of poplar for supports of their Ki's — a flat-roofed circular dwelling. Poplar shoots or slender branches were used as a substitute for willow in basket making. In spring the boys and women gathered the young tender catkins, which were eaten raw stripping them off the stem with their teeth. The Cottonwood clans of the Tewa of New Mexico, named after the cottonwood tree, were classed with the Sacred-dance clans. Their prayer sticks were made of cottonwood as were their Artifacts and tetambes, cottonwood drums. While the Thompson made their dugout canoes, riding and pack saddles of poplar, some of their neighbors in Western Washington used it for palisades around their villages. Some of the more shiftless Washington Indians used the bark for house coverings, while others, the Squaxin and Cowlitz groups, used the young shoots for constructing their sweat lodges and also for thongs and lashes. The winter buds of the balsam poplar are surrounded with a fragrant wax as a protection from freezing. Indians of the far North collected this wax as a pitch to seal the seams in their birchbark canoes and bark dishes. Bees, too, still collect it for sealing cracks in their hives.

The Meskwaki, Chippewa, and Forest Potawatomi of Wisconsin and neighboring states, boiled the buds of the balsam poplar and the aspen with bear fat or other tallow to procure a salve or balm, used to cure colds, coughs, and bronchitis. They also applied it on sprained muscles, bruises, and ulcers, and for curing earache and eczema. A poultice made of the inner bark was also applied to sores, sprains, and wounds, and placed inside the splints covering broken bones. The Forest Potawatomi made a salve of burnt-bark ashes and grease for applying to sores on their ponies. Some of the Western Washington used an infusion of boiled bark as a gargle for sore throat, of leaves as an antiseptic on cuts, and of buds as an eye wash. They also applied the gum exuding from cottonwood burls to wounds and cuts. The Creeks of Georgia made a solution of boiled bark and water for pouring over broken legs, arms, or other fractures, and made their splints of the wood of the cotton tree. Indians of the present day still use many of these remedies, but so does the white man. "Balm of Gilead" made from the buds of the balsam poplar can still be purchased at the local drugstore as a cough syrup.

The range over the world of our Populus, the people's tree, is tremendous. It produces great forests in the far north, is common along the alluvial bottom lands of streams as well as on high mountain slopes, and is found growing from the Arctic circle to northern Mexico and Lower California, and from the Atlantic to the Pacific in the New World. It also grows in England, Europe, Asia, in North Africa, along the southern slopes of the Himalayas, Central China, and Japan in the Old World. Although estimates vary, there seem to be some 35 recognized species, 15 of which are found in North America.

When growing in the open the poplar of the Plains Indians develops a massive trunk, often dividing near the ground, with a broad open crown. Normally, in the forest, it will be 80 to 100 feet tall and 3 to 4 feet in diameter, but under the most favorable conditions will reach 150 feet in height and 7 to 8 feet in diameter. The poplar of the Thompson and Western Washington Indians of Puget Sound and Canada is the mightiest of the Poplar tree clan. It is estimated individual specimens may reach as much as 225 feet in the air, and a probable maximum age of 125 to 150 years. The largest cottonwood on record grows at Millford, Neb., and measures 36 feet in circumference at 5 feet above the ground, with a limb spread of 78 feet and a height of 128 feet.

There are various famous individuals among the "people's tree" in the United States. Nebraska claims the Lone Tree — a cottonwood — growing near Central City on the banks of the Platte River, once sheltered the councils of Indian chiefs. Lone Tree Ranch, the post office, and railroad station are all named after this famous tree. The Statehouse Cottonwood located on the Capitol grounds at Topeka, Kans., is the best-loved tree of Kansas according to the Kansas State Board of Agriculture Bulletin, "Trees in Kansas." Former Presidents Harrison, McKinley, and Taft made campaign speeches

under it, and many generations of Kansas children have played under its broad canopy of leaves. Aspen, Colo., a famous skiing and winter resort area, gets its name from the aspens growing in the mountains surrounding the city. Our own community of Winnetka, Ill., where I teach school, had a famous Indian Council Tree on cottonwood, 19 feet in diameter at the base and 135 feet tall. It was a council tree for generations of Miami and Potawatomi Indian chiefs whose one time camping grounds were in the Chicago Great Lakes area. This tree fell in 1902. But, perhaps the most famous of all poplars, at least to Christian peoples, are those of the Bible. Here in the holy land of North Africa, Ephraim, younger son of Joseph, burned incense in *the groves of poplar*. The ancient Jews hanged their harps on the "poplars" as they wept over suffering Zion. The Bible uses the word "willows" in this last instance, but authorities on the Bible today believe they were poplars, as the Euphrates and White Poplar rather than willows are the common trees of Palestine. Famous in an entirely different way — infamous would be better — are the cottonwoods of the Old Southwest, used as a favorite tree on which to hang cattle thieves, rustlers, and desperadoes, as the old timers told it.

The cottonwood member of our poplar tree clan is extensively planted today in South America, especially in Chile and Argentina, both for shade and lumber. It is also often planted for shelter and ornament around ranch buildings, and along the streets of the smaller towns in the arid and almost treeless regions east of the Rocky Mountains. Canada, too, plants it as a shelter belt tree, but planting poplars is now forbidden in most cities. The ability of the roots to seek out, often over great distances, the various drainage facilities, clogging them completely, brought about their downfall for city use.

The wood of the poplar is soft in texture and easy to work. It has a light brown heartwood surrounded by a wide margin of clean white sapwood. Commercially, the poplar is becoming more important each year. It supplies ever increasing quantities of pulpwood, now used in newsprint, as well as excelsior, veneer for boxes and crates, matchwood, and lumber. Due to the light weight of the wood, clear color, and lack of odor, it is used extensively for tubs and pails for packing butter and other sensitive foods. The lumber does warp unless handled carefully; but, since it takes nails without splitting it is valuable for furniture interiors, agriculture implements, dairy, poultry, and apiary supplies. Other uses are in door sash, shuttles, bobbins, spools, looms, bread and meat boards, woodenware and novelties. According to Alexander Howard in his book on "Timbers of the World," the famous *Inlaid room* at Sizergh Castle, Westmoreland, England, dating back to the sixteenth century, was made of English Oak inlaid with *Poplar* and Bog Oak. Undoubtedly the oldest recorded use for the wood of the poplar is in the Scriptures. It tells us that weeping willow — now thought to be Euphrates Poplar — and date palm were used for rafters in the building of Nineveh, capitol of ancient Assyria on the Tigris River.

Like the Greeks, Romans, and American Indians, I can truly say that our Populus, the People's Tree, is one to love. But not on a tiny city lot! They must have room to grow and spread to show their true loveliness.

Problems and Projects

COPPER ENAMELING BY AIR-ACETYLENE TORCH

PETER T. McKINNEY
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(Part II)

(NOTE: Part I — page 168, May, 1957, issue — pointed out that many schools have acetylene for oxyacetylene welding and that some schools might arrange to use the available supply for copper enameling. Lacking such a supply, the article described the requirements for an initial setup, types of blowpipes, flame tip sizes and safety precautions.)

Literature on copper enameling will show the teacher and craftsman, skilled and unskilled, what steps to take to produce interesting creative pieces. There is, however, little if any mention of the use of an air-acetylene torch as the method for heating.

In using the air-acetylene torch you can follow the same preparation and firing instructions as that based on kiln firing. All instructions are the same for torch firing as for kiln firing with the exception that the torch technique does not permit enameling on both sides.

Tools and Materials

The following are required for copper enameling:

Air-acetylene torch

4 torch tips to fit blowpipe. Recommended: No. 1, No. 3, No. 6 and multi-flame

Acetylene hose between torch and acetylene regulator

Acetylene regulator

Fig. 1. Shown are the items needed for copper enameling with the air-acetylene torch. Not shown is the cylinder of acetylene and the firing stand

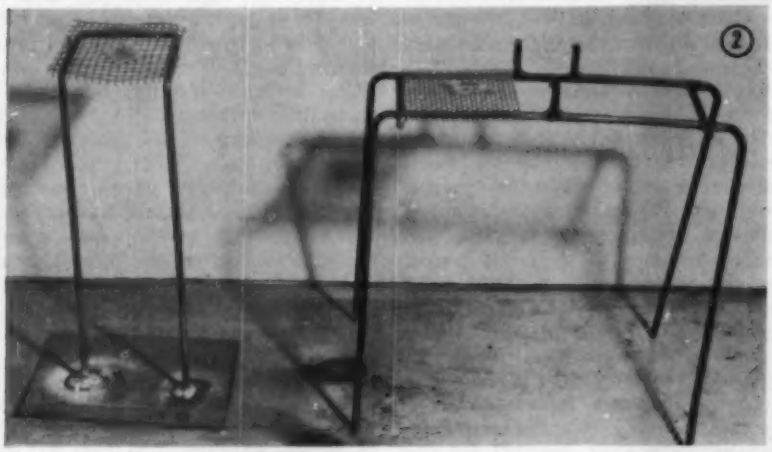

Fig. 2. The stand at the left is made of a length of ¼-in. steel welding rod. The stand is 12 in. high. At the base the legs are braze-welded to a section of ⅛-in steel. The stand at the right, also made of welding rod, has more room for firing

Cylinder of acetylene (Size *B* tank or larger)
Friction spark lighter
Steel wool
Files
Putty knife or spatula
Tweezers
Camel hair brushes
Emery cloth
Acid-core solder — small diameter
Free burning oil, gum tragacanth, or agar solution
Nictric acid or other chemical cleaning fluid
Sifter (80 mesh)
Assorted enamel powders — opaque and transparent
Enamel lumps, assorted
Enamel threads, assorted
Nicrome screen
Swirling tool (1/16 in. stainless steel rod with sharp point)
Firing stand (shop made)
Pure copper blanks for jewelry, ash trays, etc.

Firing Stand

It is advisable to have good substantial stands of the proper size which will hold the copper while it is being fired. Two ideas for stands are shown in Figure 2. These are made from ¼ in. diameter steel welding rod that is available in 36-in. lengths from any welding supply distributor. The points requiring welding in the larger stand may be bronze-welded unless the stand is used for firing larger ash trays that require the much hotter oxyacetylene flame. The smaller stand is made from one 36-in. length of steel welding rod. It requires no welding and it will be adequate for average classroom work.

Steps in Enameling

Cleaning

The first step to take is to clean the copper part on the side to be enameled. You can use fine emery cloth, steel wool, or abrasive erasers sold especially for copper cleaning. Fluid cleaners which when brushed on clean the copper and hold the powder in place may also be used. Many enamelers use a solution of nitric acid (one part) and water (5 parts) to clean copper. With younger students it would be best to use the mechanical cleaning methods first mentioned.

Following cleaning, use a small brush to apply a thin coat of enameling oil around the edges of the piece. This oil helps keep the enameling powder out to the edge during handling and firing.

Sifting

Now you are ready to use the mesh sifter to apply the dry enamel powder by the simple sifting method. It is a good idea to use sections of slick magazine pages to collect enamel powder that does not stay on the piece. After you have completed the sifting carefully move the part off the paper with a putty knife or spatula and use the paper to return the excess enamel to the bottle. Figure 3. Hold the sifter over the part and tap it gently so that you get a level coating of enamel on the part. Cover edges first and work toward the middle. The thickness of the enamel on sifting should be about 1/32 in. Another way to estimate how much enamel is needed is to cover the piece so that the copper can barely be seen, and then uniformly sift on a little more over the entire piece so that the copper is not visible.

Firing

When the copper is evenly covered with enamel powder, carefully place the part on the Nicrome screen on the firing stand. Turn the acetylene valve to start the gas flow through the Prest-O-Lite torch and light the gas using a friction spark lighter. *Do not use a match* as the hot 3800 deg. flame emerges with considerable force. Figure 4 shows the multiflame tip being used to heat this particular part. Always remember to use acetylene in this tip at from 5 to 8 lb. pressure. If you don't use a regulator that shows pressure then be sure the acetylene is flowing at a high rate. This precaution is given because at low delivery pressures the acetylene will burn within the tip and quickly ruin it. This precaution does not apply to other air-acetylene tips and you may use lower pressures of acetylene when operating them.

Firing is easy with the air-acetylene

Fig. 3. Sifting red enamel powder on a seahorse copper blank

Fig. 4. Using the multiflame tip to fire the seahorse piece

torch. After a short amount of practice on test pieces you will be expert in judging how much heat to apply. If you examine the air-acetylene flame of a multiflame tip you will see that quite near the orifices there are short cones of flames. Beyond these cones is a large bushy outer flame. When you first apply the flame to the copper, position the torch so that the short cones in the flame are about ½ in. from the lower side of the part. This will heat the copper rapidly and as the copper starts to turn dull red move the flame lower so that the bushy outer part does the final heating. The copper blank will turn from dull to a brighter red and then you will see the enamel powder slowly melt and become liquid. Play the flame around in a small circle and alternately move the flame closer and farther from the piece. When the surface of the enamel is completely liquid and has a smooth homogeneous surface, remove and extinguish the flame. Let the copper blank cool on the stand until you can handle it without burning your fingers. Do not test heat by touching with a finger. Instead, place back of your hand *near* the part and if it seems cool then test with the finger.

Here is a hint on firing irregular copper parts such as a seahorse shape. The long thin tail section of the part will get to desired temperature more quickly than the body. So direct the flame more at the body than the tail. By so doing you will avoid overheating the narrower section of the part. Follow this advice on all irregular shapes.

Design and Decoration

The foregoing describes the simple fundamentals of firing a base coat on copper using the air-acetylene flame. Decorative additions are made on the base coat according to instructions found in literature on enameling and then the copper part is fired again by the air-acetylene torch as already described. On subsequent firings the flame will melt the base coat and the added decorative effects will melt and fuse into the base coat. In firing some types of subsequent decorative effects you will have to heat the part for a slightly longer time to allow the heat to melt in the added enamels. To avoid burning out colors for these longer heating times, heat the part until the base coat melts and then move the flame away from the part so that you maintain the liquid state and the added enamel slowly melts and fuses to the base coat.

Artistic creative effects are endless in copper enameling and most of them may be attained by the torch. You have scores of low-cost prepared shapes, colors, and types of enamels with which to work. Beginners can easily decorate base coats with enamel threads and lumps. These threads and lumps are melted into a base coat to form interesting patterns or they may be swirled to form unusual and attractive decorative designs. Threads can be used to form abstract designs or outline patterns of leaves, houses, people, and other things. Using the stencil method to create designs is easy and has endless original design possibilities. Swirling is easy to do with an air-acetylene torch. Use the torch flame to melt the base coat and the threads or lumps which have been placed on top. (NOTE: Do not use lumps that are too large. They won't melt down and they are apt to crack out later. They should not be more than ⅛ in. diameter.) While you are melting the base coat and lump or thread additions, pre-

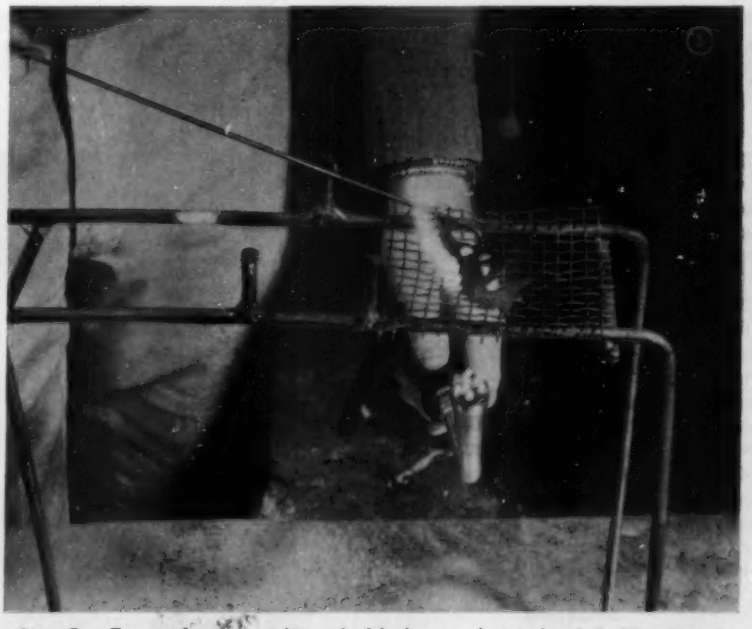

Fig. 5. To perform swirling, hold the torch in the left hand and swirl with the right (if right-handed). Be sure to preheat the swirling tool by holding it in the flame as the copper part is being heated. Swirling is easier if two people work together — one person heats, the other uses swirling tools

Fig. 6. Three types of finished enameled pieces produced by torch soldering enameled parts together.

heat the swirling tool until it is red hot (Fig. 5). A cold swirling tool tends to stick to the melted enamel. When the lumps or threads have melted down into the base coat put the swirling tool's sharp point quickly into the place you wish to swirl. For instance if you insert the sharp tip into the center of a melted lump of contrasting color and draw the tip into the area of base coat you will get a beautiful curved design. Lift the tool and repeat with other lumps. The swirling tool may also be used to swirl threads or narrow (¼ in.) bands of contrasting enamels.

The sifting technique of enamel powder application works well with the paper stencil method of design creation. Stencils easily cut from paper are tightly held over base coated pieces and through the stencil cut out enamels of contrasting colors are sifted. The stencil is removed leaving the design and the part is fired.

Additional Techniques

It would be impossible in this article to describe all of the techniques used to attain decoration and design by copper enameling. Here are a few: sgraffito, drawing lines through a sifted but unfired coat of enamel; string design, sifting over a string that has been allowed to fall over a base coat in loops (string is removed, piece fired); wet inlay or pack method of enamel application, difficult but extremely professional results; slush or crackle finish, simple to apply and producing a miraculous finish; gold and silver foils under transparent colors; cloisonné or partitioned areas of raised colors; and copper wire accents. Details on how to perform these processes will be found in the literature listed below.

Soldering

The No. 1 tip is most frequently used for soldering jewelry findings to the backs of earrings, tie clasps, pins, etc. For this type of soldering use a minimum of acid core solder and you will have less clean-up trouble.

With the air-acetylene torch you can solder so quickly and conveniently that you should not overlook it as a method to create diverse designs. With the intense pinpoint flame from the No. 1 tip you can quickly obtain a soldering temperature. Note the three objects in Figure 6 in which soldering was used to create design or to add the personal touch. The tie clasp was made from two ¾-in. square blanks and one horseshoe blank. The horseshoe was enameled first by swirling red lumps on a cream base coat. Then the two squares were positioned corner to corner on a flat surface and the horseshoe shape was placed as shown in the sketch. Oil was applied to the squares, a color was sifted over squares and horseshoe. The horseshoe was carefully lifted off leaving bare copper areas on the squares for later soldering. The squares were fired, cooled, and then the lumps were added and swirled. Then the three pieces were carefully cleaned with emery cloth in the areas to be soldered. Next step was to add solder to back of horseshoe and to the corner of each square. The three parts were then carefully aligned on the Nicro screen on the stand and heated from *underneath* to melt the adjoining soldered surfaces. The back is then cleaned with emery, steel wool, and wire brushing, and the assembly is placed on a metal-topped table enamel side down. It is best to apply solder to the back of the assembly where it is to be soldered to the alligator tie clasp. When the flame is used to get solder on the back of the assembly you may soften the solder holding the pieces together. Therefore, the assembly should be supported as shown in the sketch, Figure 7. After the solder has been applied to the back of the assembly it must be allowed to cool without disturbing. A small amount of solder should then be applied to the tie clasp finding where it is to be fastened to the copper assembly. Finally the soldered surface of the clasp is placed on the cooled enameled assembly and the flame of the No. 1 tip is directed on the back of the enameled pieces and the tie clasp. In a matter of seconds the soldered surfaces melt and join, to complete the tie clasp.

With the number of copper blanks of different shapes available there is no limit to the creation of unusual pins, bracelets, tie clips, etc., that can be made by soldering. The rectangular ash tray in Figure 6 was made by placing the initials on the copper blank, sifting on enamel and then removing the copper initials. In that way the copper under the initials was left bare for soldering on the initials by applying the soldering heat from underneath.

The troughs for cigarettes at each end

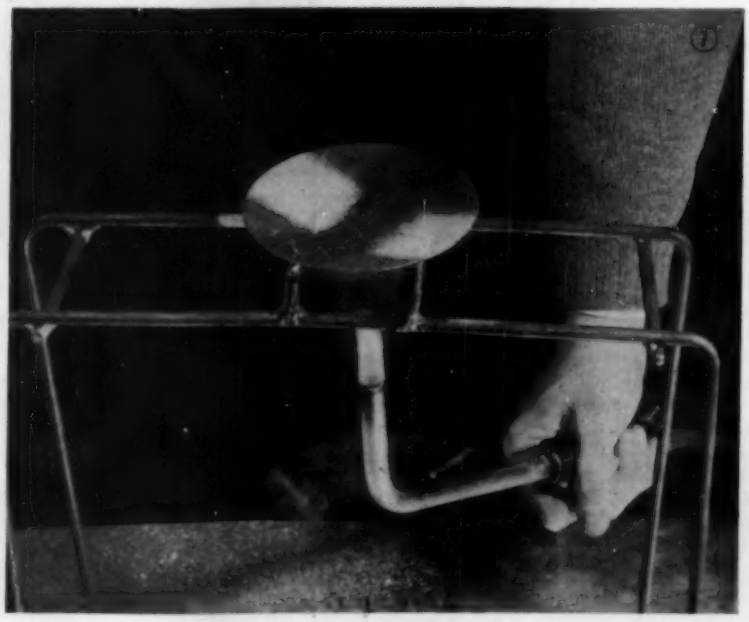

Fig. 7. Using a No. 6 torch tip to fire a 4 or 6-in. diameter ash tray

were formed and enameled and soldered on as follows: File a V on the edges of the tray where troughs are to be soldered. Put tray on stand and apply heat from No. 3 tip *underneath* each filed V to enable you to apply a thin coat of solder in V's. Apply thin coat of solder (No. 1 tip) to copper side of troughs at point where they are to be soldered to the tray. Position troughs on metal-top table upside down and align tray also upside down on top of troughs and support at sides in desired position. Use No. 3 tip to heat underside of tray and troughs to melt and fuse solder previously applied. The local heat applied to solder each trough will not melt the soldered joint between tray and initials.

The ash tray with the horse's head is made from three copper blanks: 4-in. ash tray, 1½-in. round flat blank, and copper shape of horse head. To make an item like this put the small round blank in center of the tray. Sift with a dark opaque enamel, lift off small copper blank and fire the tray. Cool and place round copper blank back on tray and paint on white slush. Remove copper blank and let tray dry and then fire. The firing will produce the crackle finish from the slush coat. Next put horse head on copper blank and sift on red, remove horse head blank and fire the round copper blank. You can then sift white on horse head blank and fire. Clean round copper blank in area where horse head is to be and the unenameled side of horse head and solder latter to round copper blank. Clean back of round copper blank and round area in center of tray and solder the round blank to the tray. All heat of soldering is applied to copper *only*, not to the enameled surfaces.

Figure 7 shows the No. 6 tip being used to fire a 6-in. diameter ash tray. Note that the ash tray is resting on the three steel stilts that have been fusion welded to the horizontal bars of the stand. To cut down heat loss when doing one of these ash trays it is helpful to put a large Pyrex bowl upside down over the tray. No part of the Pyrex bowl should come in contact with the tray being fired. After each firing of the tray remove it from the stand, place it upside down on a burnproof surface and put a weight such as a flat-iron on the bottom of the tray. This prevents warpage.

The quick clean intense heat produced by the air-acetylene torch makes it a tool that is used widely in industry and crafts. It is used for soldering in electronics and in metalworking. Plumbers, sheet-metal workers, telephone and electric utility workers, air conditioning installers and repairmen use the air-acetylene torch as a tool. By teaching students its use in copper enameling you will be giving them some basic fundamentals in a skill that may well become personally useful. At the same time you will gain extreme satisfaction that the torch is stimulating and developing creative abilities.

Bibliography

Some available booklets on copper enameling:

*Enamel-on-Copper Idea Book,** The Copper Shop, 1812 E. 13th Street, Cleveland 14, Ohio, 25 cents

Copper Enameling, Professional Publications, Inc., 4175 N. High Street, Columbus 14, Ohio, $2

Enameling on Copper and Other Metals, Thomas E. Thompson Co., 1539 Deerfield Road, Highland Park, Ill., $1

*Metal Enameling,** American Art Clay Company, 4717 W. 16th Street, Indianapolis 24, Ind., 25 cents

How to Enamel on Copper, Foster Art Service, Inc., Box 456, Laguna Beach, Calif., $1

*Copper Craft Instruction and Project Manual,** Kap Pak Products, Inc., 156 W. Walton Place, Chicago, Ill., 50 cents

Comprehensive book:

Enameling Principles and Practice, by Kenneth F. Bates (found in most public libraries)

*Supply catalogs are incorporated in these booklets.

Are you storing lumber for a future use? Seal the ends with a thinned coat of fresh, white shellac and keep it on a rack off the floor. — *Shellac Information Bureau.*

Falls killed 20,000 persons in 1956. Only traffic accidents took more lives. — *Facts About Falls.*

MODERN BUD VASES

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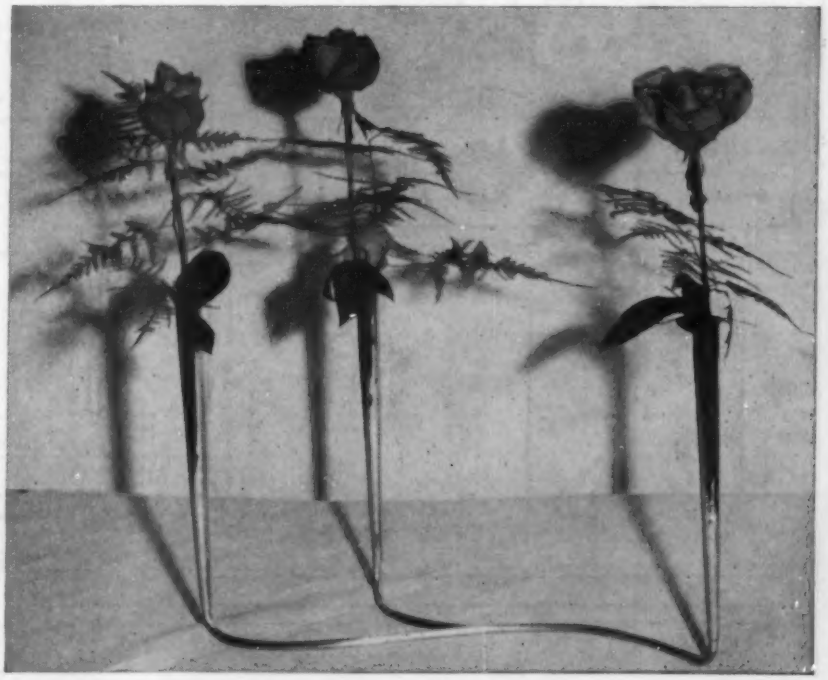
The final touch of beauty to most rooms is usually a picture, an ornament, a vase or some device especially designed to add a particular touch. The delicateness and beauty of the rose bud serves this final decorative look when placed in the brass vases described in this article.

The design of these bud vases is not only in keeping with the modern day trend toward simplicity in appearance, but also simplicity in construction. The design consists of three brass bud vases soldered to three upturned ends of brass rod.

This procedure may be followed in making the vases. First, lay out a graph consisting of ½ inch squares on a sheet of drawing paper approximately 9 by 18 inches. On this graph paper draw the form which is to represent the plan of the base. Take a piece of ¼-in brass rod 24½ in. long and cut it into two pieces, one 18 in. and the other 6½ in. By use of a bending jig or a mallet and stake take the 18-in. piece and bend both ends up to a 90-deg. angle and on the 6½-in. piece bend one end up to a 90-deg. angle. By following the pattern drawn on the graph form the contours, being careful to keep the upturned ends perpendicular.



Modern bud vases

— Photograph, Irving C. Gaither

In order to make a good fitting joint the joining end of the short piece should be filed to conform to the roundness and contour of the long piece. In assembling the two parts together silver solder should be used in order to produce a strong joint.

The next step is making the vases. This operation may appear the most difficult, but if these procedures are followed it will become relatively easy. A layout or flat pattern must be made so that the material may be cut and also to keep uniformity in the vases. Using this pattern as a guide cut the vases from a sheet of 22 gauge brass. Before forming the vases the metal should be annealed for easy working. If a stake is not available to provide a ¼-in. circle, a hardwood form can be turned to act as a stake. For best results in forming the vases it is advisable to anneal them frequently. After forming the vases join the seams together with silver solder. After soldering file the seams to diminish their appearance. Pickling the brass vase units in a solution of one part nitric acid to ten parts water will aid in removing the oxide scale. After cleaning the vases they should be checked for water leaks. If no leaks appear, remove all scratches using a buffing wheel or fine abrasive cloth.

The final step before finishing is assembling the vases to the base. This is done very easily by soft soldering. The only precaution is to be careful to keep the vases straight.

Processes involved in the construction of this unit includes: graph development, radial line development, bending and forming on a stake, silver soldering, soft soldering, buffing and finishing. The varied operations used in producing this item makes it a good project in a general metals or art metal shop. The final product is an object of beauty, value and function that would provide sufficient motivation to the maker, as well as considerable appeal to the owner.

Variations in the project might incorporate different base forms as well as the use of copper or silver instead of brass.

About 300 million tons of crude oil and petroleum products are transported in the United States each year. This volume places the petroleum industry among the nation's leading freight movers. — *Petroleum Newsnotes.*

COMBINATION MITER BOX AND GLUING JIG

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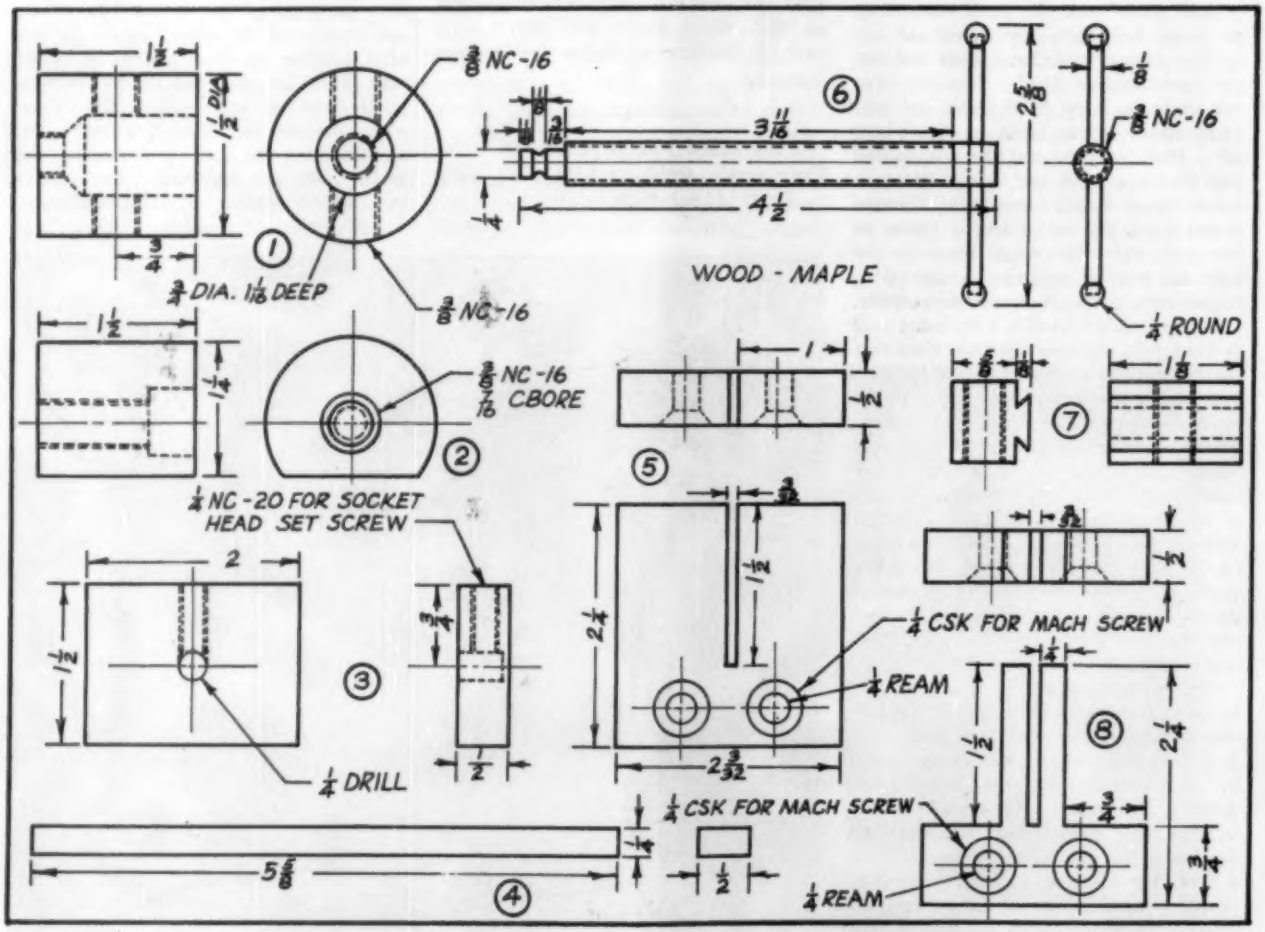
Pre-high school students customarily are not allowed to use power tools, although the need for these students to cut angles ordinarily facilitated by the use of power tools arises often, particularly in the construction of picture frames, a popular project for students in this age group. As a result of observing this very necessary safety precaution I have designed and made for students' use in cutting angles a combination miter box and gluing jig.

A miter box of this type could be very practically constructed in a machine shop as a term project. It is of rigid construction but at the same time is less bulky than ordinary miter boxes. With its simplified construction and a base of cast aluminum a carpenter could easily fit it into his toolbox. Where the base is cast out of aluminum the student would receive experience in patternmaking, foundry, lathe,

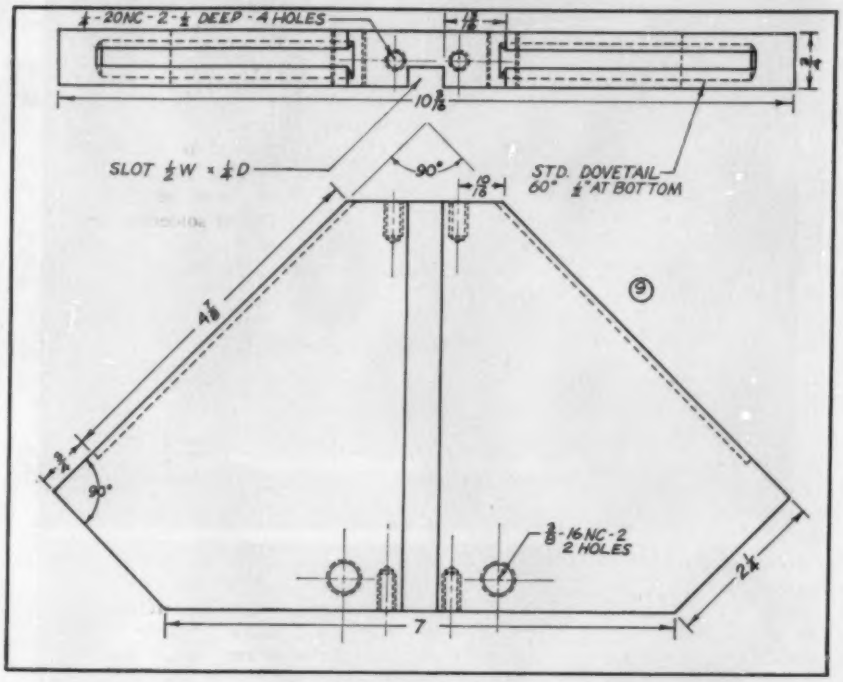


Details of the combination miter box and gluing jig

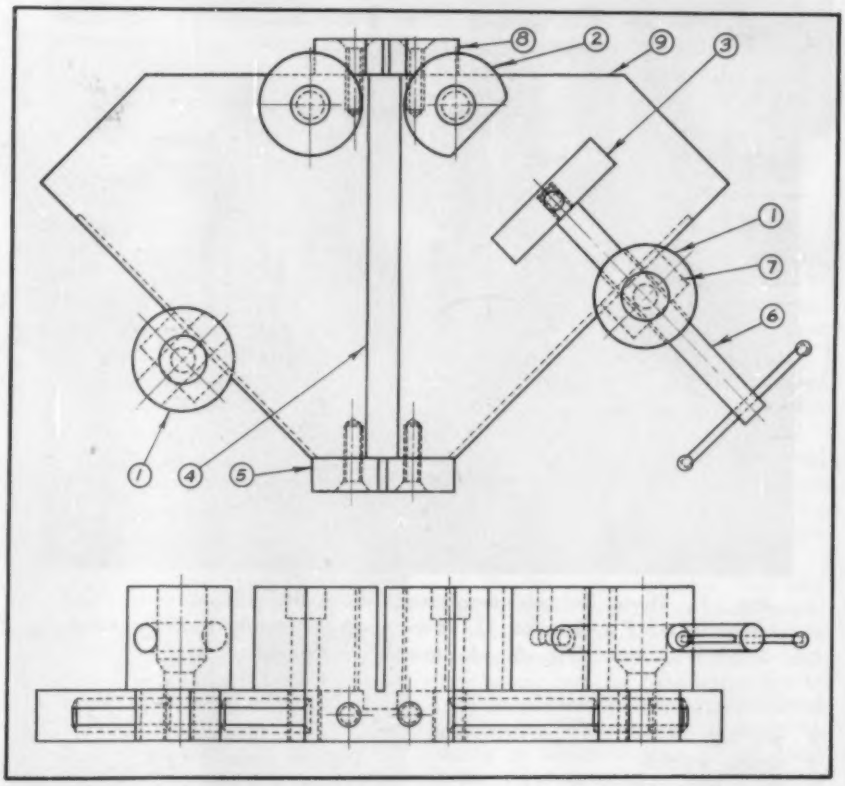
mill, and shaper work, thereby profiting not only from the use of the miter box but in its construction as well.

In most cases the box would be set for a 45-deg. angle and left at this position. Where there is no occasion for sawing angles other than 45-deg., the construction would be further simplified by eliminating the dovetails and leaving the screws stationary. In this case a welded construction could be considered. If used in the school shop it could be handily used as a gluing jig or a device to hold work for fastening with other means than glue.

Detailed drawings of this combination miter box and gluing jig are shown to simplify its construction by anyone desiring to make use of it with pre-high school students as I have. Under the circumstances described, it is a most helpful device for remedying an awkward situation.



Miter box details



Further details of the miter box

A PLANNED TOOL PANEL FOR THE AUTO-MECHANICS AREA

JOHN D. EHRENBORG
Instructor of Automechanics
Herbert Hoover High School
San Diego, Calif.

In the industrial-arts auto-mechanics area one of the most important aspects of shop organization is the construction of the tool panel. If the panel is well planned and properly constructed, many problems will be overcome.

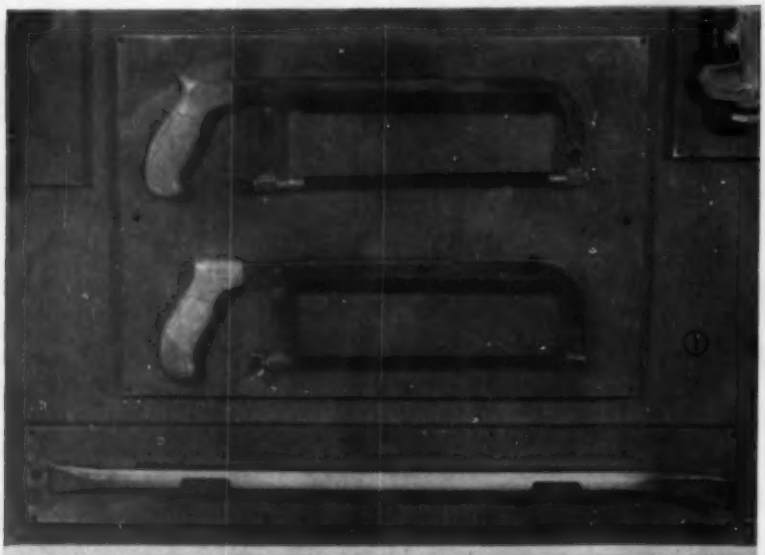
The new shop teacher, or the individual who is planning on redesigning an old tool panel, must put much thought into the design of the unit. It is necessary to consider durability, appearance, cleanliness, orderliness, and ease of noting missing tools when planning the panel.

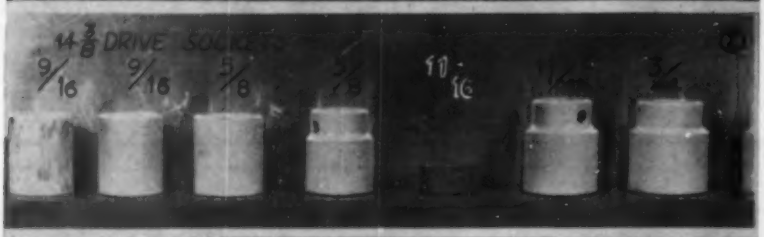
Preplanning the Panel

Before the plan is laid out, ideas regarding the tool-holder design should be gathered. It is beneficial to tour the school shops throughout the immediate locale to observe how other instructors have solved similar tool hanging problems. Books and magazines should be scanned for fruitful ideas. A 35mm. camera is a great asset to the designer as pictures taken during visitations to other shops can be used during the construction stages.

After the ideas have been gathered from the local resources, it is necessary to plan for the final design of the individual units. It is important to understand the number and kind of individual tools that are to be incorporated into the panel. The following tools were found to be adequate for the writer's panel.

- 4 body hammers
- 2 diagonal cutters
- 2 water pump pliers
- 2 8" screw drivers
- 4 4" screw drivers
- 2 stubby screw drivers
- 6 clutch screw drivers
- 4 files





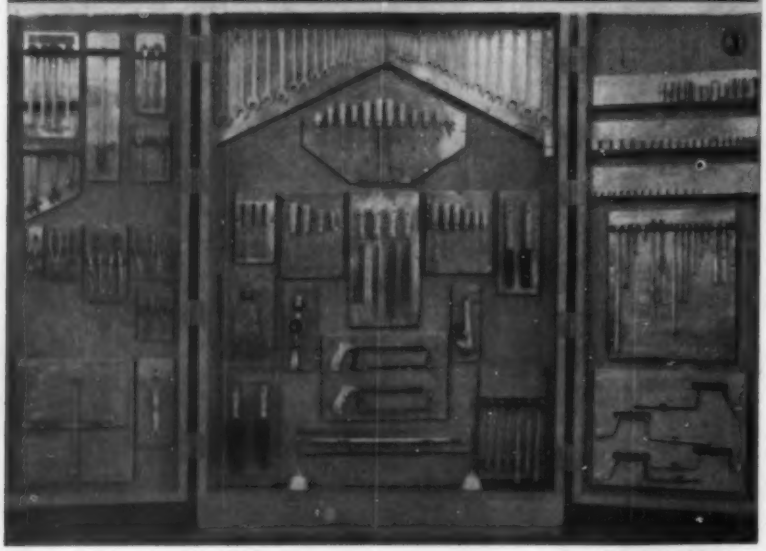


Fig. 1. These holders emphasize durability, appearance, and cleanliness. Fig. 2. The 11/16-in. socket is easily noted missing. Fig. 3. A planned tool panel

1 pry bar
1 torque wrench
1 drain plug wrench
1 pipe wrench
6 ball-peen hammers
2 long-nose pliers
4 combination pliers
2 6″ screw drivers
2 3″ screw drivers
4 Phillips screw drivers
3 carbon scrapers
2 wire brushes
2 bench brooms
2 hack saws
1 brake spoon
3 adjustable end wrenches

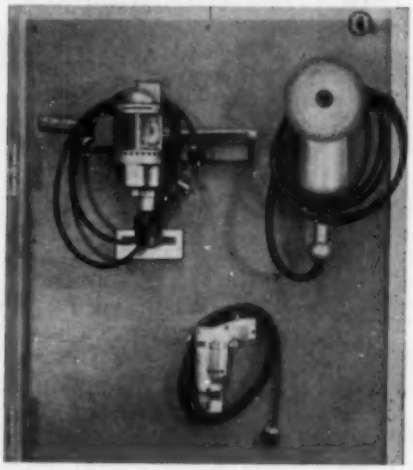


Fig. 4. Individual tool panel for power tools

1 whisk broom
1 ¼″ drill
1 lug wrench
3 oil cans
2 each box end wrenches from 1¼″ to ⅝″ inclusive
4 each box end wrenches from 9/16″ to ½″ inclusive
2 each box end wrenches from 7/16″ to 5/16″ inclusive
1 set ½″ square drive deep sockets from ½″ to 1″ inclusive
1 set ½″ square drive short sockets from 1¼″ to 5/16″ inclusive
2 sets ⅜″ square drive short sockets from ¾″ to 5/16″ inclusive
6 ⅜″ square drive extensions
2 ⅜″ square drive speed handles
4 ½″ square drive extensions
2 ½″ square drive speed handles
2 ⅜″ square drive hinge handles
2 ⅜″ square drive ratchets
2 ½″ square drive hinge handles
2 ½″ square drive ratchets

Once the tool list has been established, the builder can draw out a plan of the tool panel to scale and place the holders in position. The layout may then be organized and construction started on the individual units. During the construction of the panel, the designer should keep in mind durability, appearance, and cleanliness. The section shown in Figure 1 incorporates these facets of design. It can be noted that the holders are metal backed for ease of cleaning. The appearance of these holders is enhanced by the bright red metal holder placed against a shiny metallic aluminum background. This color combination is very attractive. The metal with which the holders are constructed will defy abuse and mistreatment for many years.

Spotting Missing Tools

In the industrial-arts auto-mechanics area, class time for the cleanup period is limited. It is essential, therefore, to assign the responsibility of the tool panel to dependable and worthy students. If the toolholders are organized into individual sections, the cleanup may be expedited due to the ease with which missing tools may be noted. This is a very important aspect of shop organization. Figure 2 illustrates this type of holder. It can be easily noticed from the empty toolholder that the $1\frac{1}{16}$ in. socket is missing. A minimum amount of time will be spent in locating the misplaced tool.

Tool Care

One of the ramifications of tool panel construction which might not be considered immediately important is the teaching of tool care and orderliness. If the panel can give the feeling of organization and cleanliness from its appearance, the students will then follow the example set for them. Figure 3 illustrates an orderly tool panel.

Correct Placement of Tools

The panel should be constructed so that only the correct tool can be replaced on the empty holder. Figure 2 demonstrates this point. The missing tool is an $1\frac{1}{16}$ in. socket. It can be noted that only such a socket can be properly placed on the bolt head. These points are not often remembered and should be kept in mind during the planning stages of the tool panel.

Individual Tool Panels

Inasmuch as space is limited on the tool panel, some tools will need to be kept at other locations. Individual tool panels are the solution to this problem. Figure 4 illustrates a type of individual tool panel. Other types could be made for battery tools, welding equipment, valve tools, piston ring tools, et cetera. These individual holders can be located in the area where they are used most often. Thus, in a tight shop period schedule, many steps can be saved by having tools located at strategic points.

In the auto-mechanics area the tool panel is one of the most important aspects of shop organization. The instructor should spend a maximum amount of time planning the panel so that it will be durable, neat, and easy to keep clean. Such a panel will be an asset in teaching students orderly habits in tool maintenance. Individual tool panels will benefit the students and teacher alike. These panels can be located in the areas where they are to be used most. If the panel is well organized and thoroughly planned, it will relieve the teacher of many problems in the auto-mechanics area.

A POCKET SILK-SCREEN PRINTING UNIT

FRANCIS J. KAFKA
New York City, N. Y.

An interesting, complete silk screen printing unit, of pocket, portable size is shown in the accompanying photographs. It has the double advantage of introducing the entire area of silk screen printing to the student, as well as giving him a complete printing unit which he can keep as a project.

The student experiences the following processes:

1. Preparing the design.
2. Cutting the stencil.
3. Constructing the screen frame, and the squeegee.
4. Stretching the frame.
5. Sealing the frame.
6. Mounting the stencil.
7. Silk screen printing.

The average student when he does explore this phase of the graphic arts, does not have opportunity to actually construct and stretch the frame. Under rare circumstances, due to cost factor does he construct the unit and keep the unit as a permanent project.

— Photographs by Francis J. Kafka

— Photographs by Francis J. Kafka

The steps:

1. Prepare the design on graph paper. A simple monogram or combination of initials is suggested for the starting design, as it can be used to personalize book covers, notebooks, etc. Figure 1.

2. The design is transferred to waxed stencil paper or tympan paper, using carbon paper for transferring. Figure 2.

3. The design is cut out of the waxed stencil paper or tympan paper using the corner of a single-edge razor blade. Cutting should be done on a plate of glass to assure keen cuts. Figure 3.

4. The frame is constructed from four strips of heavy chipboard or binder board. A frame approximately 4 by 5 inches is a workable size. Any conventional joint may be cut into the cardboard strips to form the corners. The four strips are joined with staples. The squeegee is made by cutting an additional piece of the board to the proper dimensions. Figure 4.

5. A small rectangle of silk screen silk or cotton taffeta is stretched across the frame with the use of staples. Figure 5.

6. The frame is sealed in the conventional manner using gummed kraft paper tape. Figure 6.

— Photographs by Francis J. Kafka

7. The frame is lowered onto the stencil plate and ordinary finger paint (water soluble) is run across the screen. This will adhere the plate into place sufficient for at least 100 printings. Figure 7.

8. The frame with attached stencil plate is turned over and the open areas are picked out of the stencil with the thumbnail. Better adhering of the stencil is assured when the entire plate, including cut-out portions, is adhered together. Figure 8.

9. The unit is now ready for use. Figure 9. Other types of paint, oil colors, textile colors, etc., may be used. The advantage of finger paint or thick tempera paint is that the entire unit may be cleaned with warm water.

The total cost of this unit has to be computed in pennies! The *entire* area of screen printing is covered in essential, basic presentation, and becomes a complete learning unit. The student has a project he can take home and use.

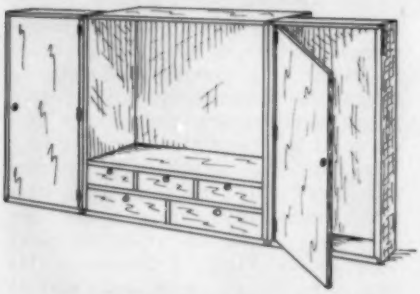
All photographs made by the author.

On October 16, 1912, the flight duration record was established at 6 hours, 35 minutes, and 10 seconds. — *Wisconsin Military District.*

WALL TOOL CABINET

V. E. BROADBENT
San Jose, Calif.

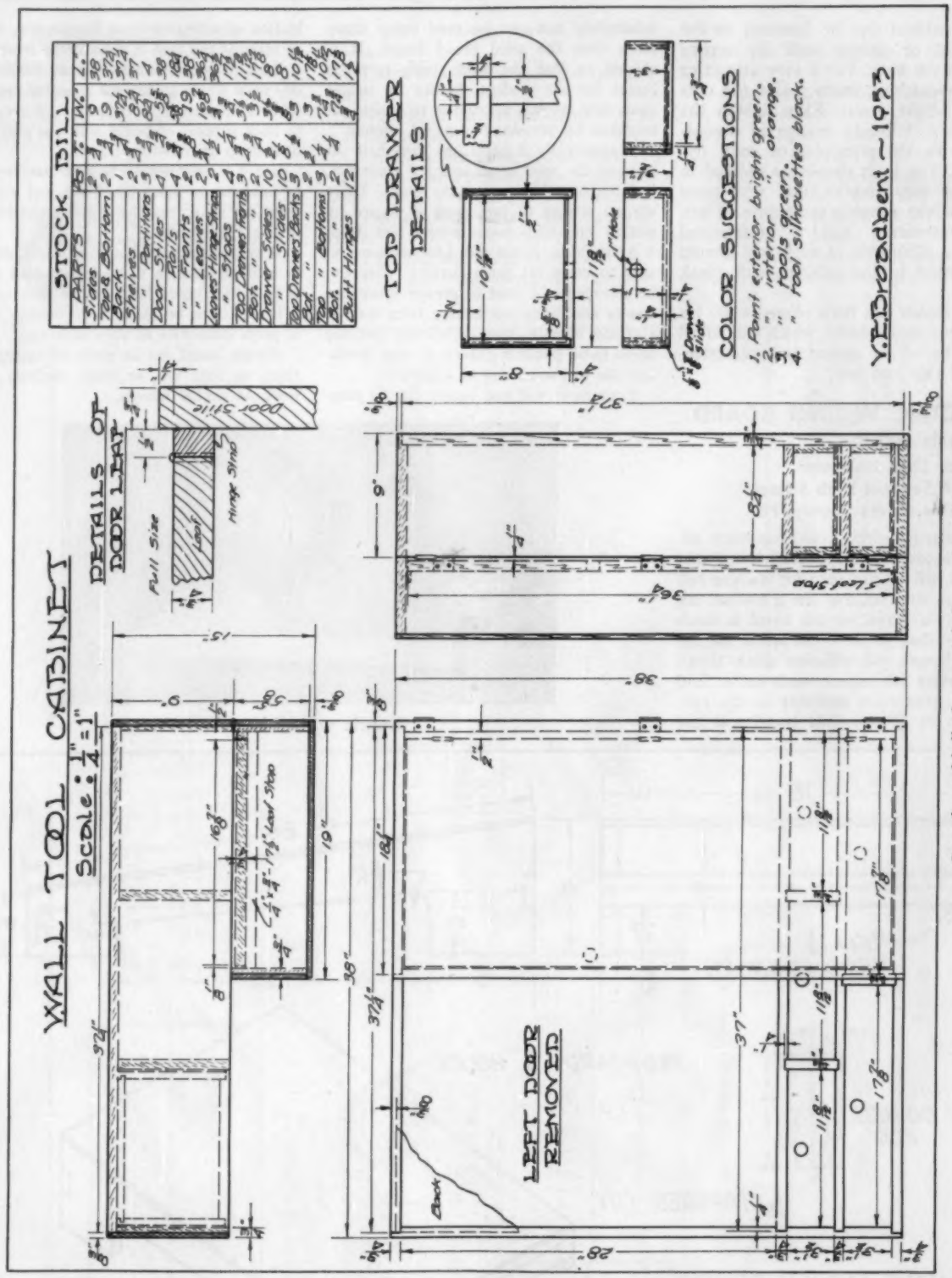
As any homeowner can testify tools are a necessity for everyday living even if he doesn't go in for woodwork as a hobby. The trouble is that invariably when a tool is wanted for some needed repair or addition to the home much time and enthusiasm is wasted in hunting for the misplaced equipment. With that in mind the writer has made a wall tool cabinet for safe and convenient storage of all ordinary tools. It holds far more than the average tool chest and is much more accessible.



Construction is so simple that, while power tools are work and time saving, this cabinet can be made with hand tools. Any wood is all right but the back and fronts should be made of plywood to minimize cracking and warping. The frame and doors are made with simple rabbet joints for added strength. The shelves are fastened with dado joints.

At least three hinges are necessary for each door due to the weight of the tools. The same applies to the inner leaves which greatly increase the capacity of the cabinet. A good hasp and padlock will insure that the tools will

The wall tool cabinet


WALL TOOL CABINET
Scale: 1" = 1"
DETAILS OF DOOR LEAF
TOP DRAWER DETAILS
COLOR SUGGESTIONS
1. Paint exterior bright green.
2. " interior " orange.
3. " tools green.
4. " tool silhouettes black.
Y.E.Broadbent — 1933
LEFT DOOR REMOVED
Details and bill of materials for making the cabinet

always be in their places when needed.

No attempt was made in this drawing to draw racks for the tools as this will vary according to the equipment of the owner. A study of the photographs will suggest methods. It will be noticed that such tools as chisels and files rest on little shelves with the upper ends inserted in wood or metal brackets. They can then be removed by slightly lifting up on the tools, swinging out, and pulling down on the tools. Many of the tools can be fastened with adjustable spring brackets that can be purchased at most 15 cent stores. For looks and permanence avoid simply driving nails into the cabinet.

The drawers are provided to hold the lesser used tools, pencils, and hardware. Holes are bored into the fronts to act as drawer pulls.

The cabinet can be fastened to the basement or garage wall by screws through the back. For a very attractive and eye-catching finish, paint the outside a bright green. Then lighten the interior with bright orange in accordance with the principles of color dynamics. The tools should be painted in part for easy identification with some color of the owner's preference. Then, for convenience and a professional touch, a silhouette of each tool should be painted in the cabinet with black enamel.

The maker has been offered $100 for his empty tool cabinet, which will afford some idea of the appeal and attractiveness of this tool box.

ELECTRIC WIRING BOARD

BERNARD MYERS
General Shop Instructor
William Tennent High School
Johnsville, Bucks County, Pa.

The electric wiring board has many advantages over the solid bread board that has and still is being used for teaching bell wiring to students. For one a student can construct a circuit on this board in much less time than on the bread board. He can make changes and additions much faster. His circuits will appear much neater, and he will have more flexibility in the constuction of splices. This board will last indefinitely and can be used many times more than the solid bread board. It is shaped so that the work angle is much better for the student. Makes for neater shop, and allows instructor to point out mistakes by removing parts of circuits.

Economically it costs less than half the price of the solid bread board to construct, and outlasts this type many years. There are no staples to buy, wire is secure by slotted one inch long dowels, cut from 4 ft. by ¼ in. dowel rod. Less tools necessary to construct same circuits. Wire can be salvaged and used in greater quantities due to absolutely no damage from staples. Circuits operate more efficiently because there is no possible chance of wire breakage due to hammering of staples.

Equipment will last longer due to elimination of vibration from hammering, such as often is the case in solid bread boards.

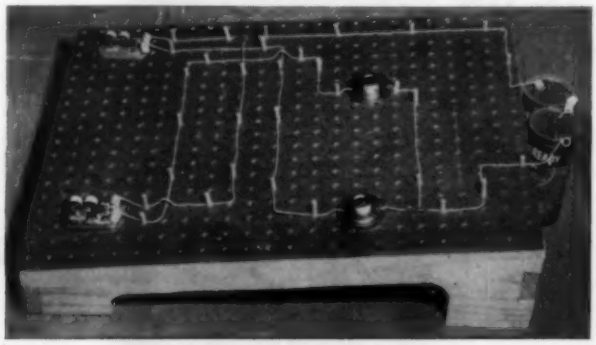
Back of board is approximate height of dry cells which makes for a neater run of wire to surface. Dry cells may be secured to back support of board with the addition of a strap or transformer.

Board is easy for student to handle due to lightness of material. Tools and equipment not in use may be stored under board saving work space.

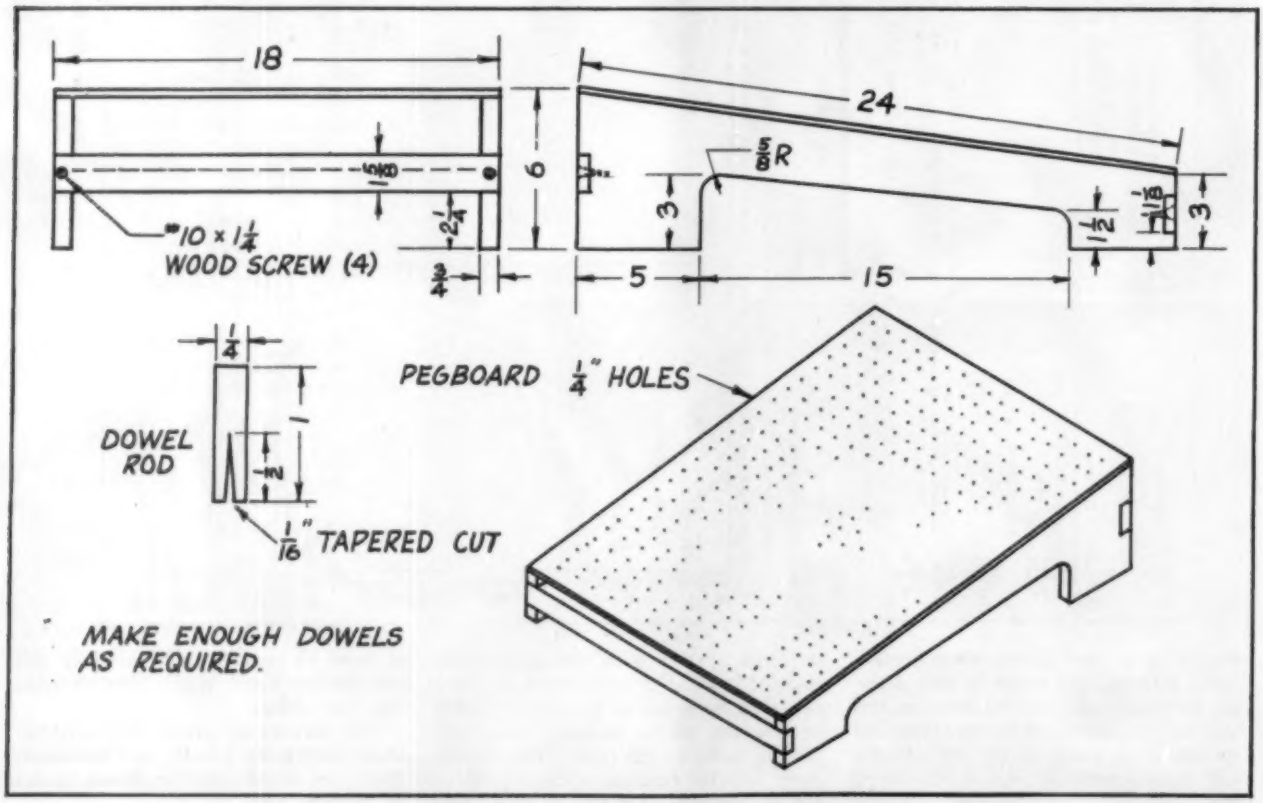
Wire passes through slot in dowel, dowel is inserted in hole in pegboard until wire is flush with board holding wire secure.

Dowels can be made very quickly, and in great quantities at very little cost.

Wiring board can be made in variety of sizes, so that one or more students can work on similar boards.



Electric wiring board



Details of the electric wiring board

SOLDERING IRON

HAROLD V. JOHNSON
Machine Shop Instructor
Canton Senior High School
Canton, Ill.

List of Materials

No. of Pieces	*Material*	*Size*
1	Cold rolled steel	1 x 2 in.
1	Cold rolled steel	⅝ x 4½ in.
1	Thin wall conduit	3⅞ in. long
1	Copper	¾ x 2½ in.
1	Hardwood, maple or similar wood	1½ x 1½ x 6 in.

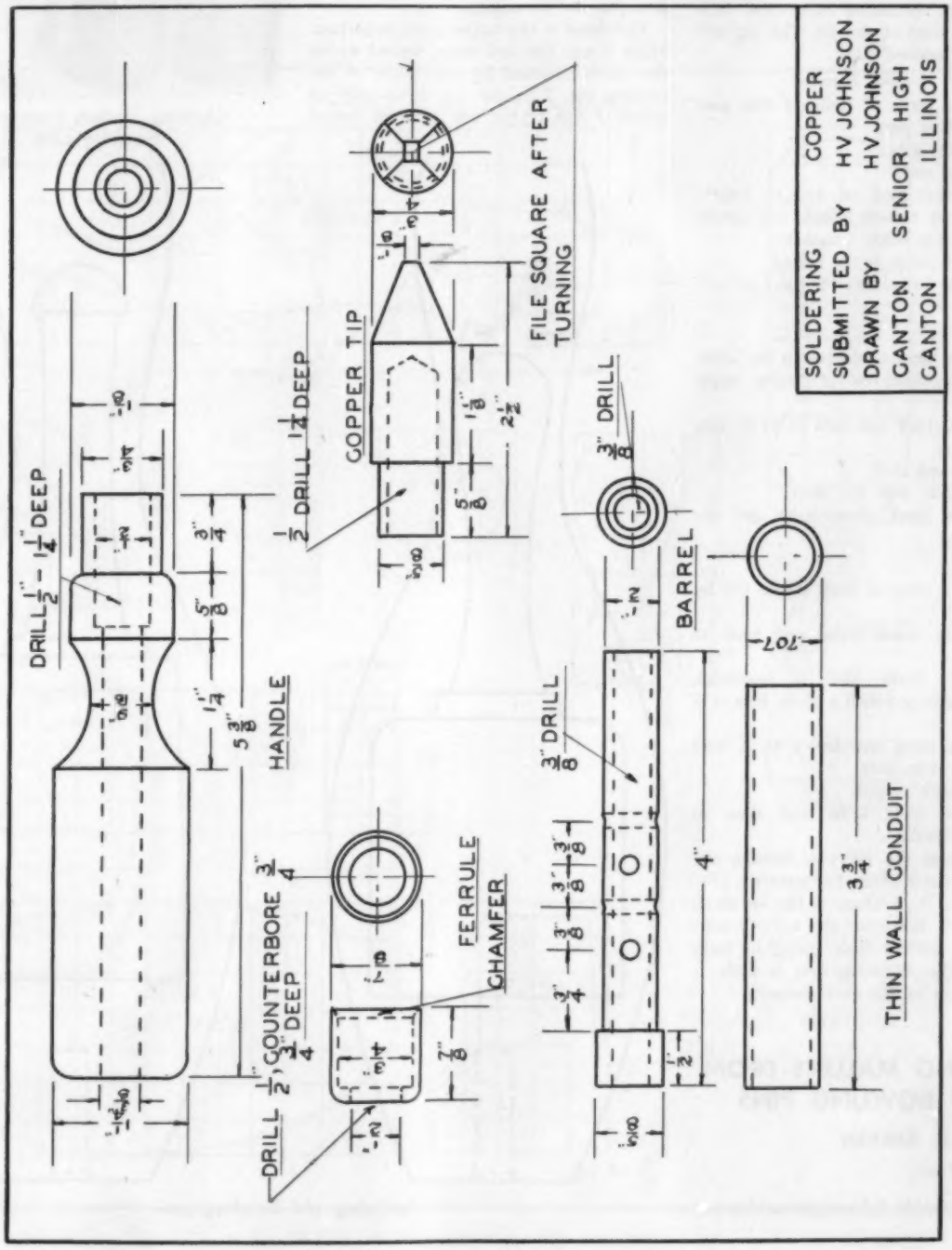
Procedure

Ferrule

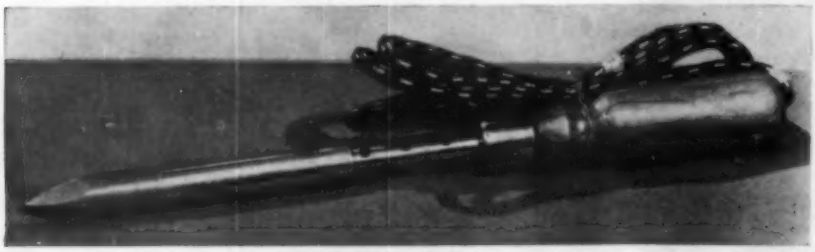
1. Chuck a piece of 1 by 2 in a four-jaw chuck.
2. Turn to ⅞ dia. for a distance of 1 in.
3. Center drill.
4. Drill 1 in. deep with a ½-in. drill.
5. Counterbore with a ½-in. drill ¾ in. deep.
6. Cut off with parting tool to ⅞-in. length.
7. Face end and round corner with file.
8. File and polish with fine abrasive cloth.

Barrel

1. A piece ⅝ by 4½ in. is needed for this part.
2. Countersink drill both ends.
3. Place between centers on the lathe and turn to ½-in. diameter as shown.
4. File and polish on the lathe.
5. Drill a ⅜-in. hole through the entire piece.
6. Remove from lathe and drill 3/16 ventilating holes as shown.
7. NOTE: The 3/16-in. holes can be easily drilled if a simple drill jig is made to drill these holes. This jig can be made from a



Details of the soldering iron



The assembled soldering iron

piece of square cold rolled stock with a ⅜-in. hole drilled through its entire length. Lay out the ventilating holes and drill through two sides of the jig. This jig will save a lot of spoiled stock.

Container for Heating Element

1. Secure a piece of ordinary thin wall conduit for this part.
2. Chuck in lathe.
3. Face one end.
4. Face other end to 3¾ in length. NOTE: Do not tighten chuck too tightly as the conduit is easily squashed.
5. File and polish in the lathe.
6. Press the barrel into the piece of conduit.

Copper Tip

1. Chuck a piece of copper in the lathe.
2. Set compound rest at 70-deg. angle and turn.
3. Reverse stock and turn to ⅝-in. dia. by ⅝ in. long.
4. Countersink drill.
5. Drill ½-in. hole 1¼ deep.
6. Remove stock from lathe and file point square.

Handle

1. Secure a piece of hard maple 1½ by 1½ by 6 in.
2. Place in wood lathe and turn to dimensions.
3. Place a ½-in. drill in headstock spindle of lathe and drill a ½-in. hole, 1¼ in. deep.
4. Reverse stock and drill a ⅜-in. hole to meet the ½-in. hole.
5. Sand stock smooth.
6. Remove from lathe and stain or enamel the handle.

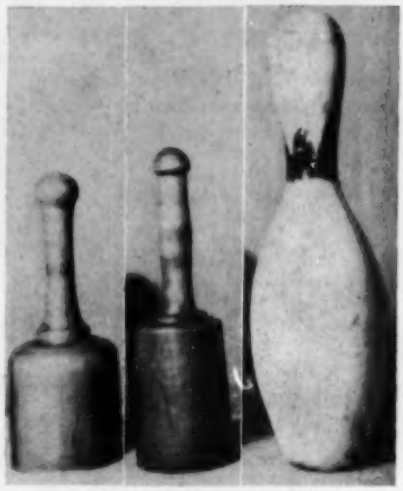
We purchase the 100-watt heating elements from the NuTone Laboratories, 1240 W. Lawrence St., Chicago 7, Ill., for about 25 cents each. We found this a much more satisfactory method than trying to make our own. The soldering iron is built to fit this particular 100-watt element.

CARVING MALLETS FROM OLD BOWLING PINS

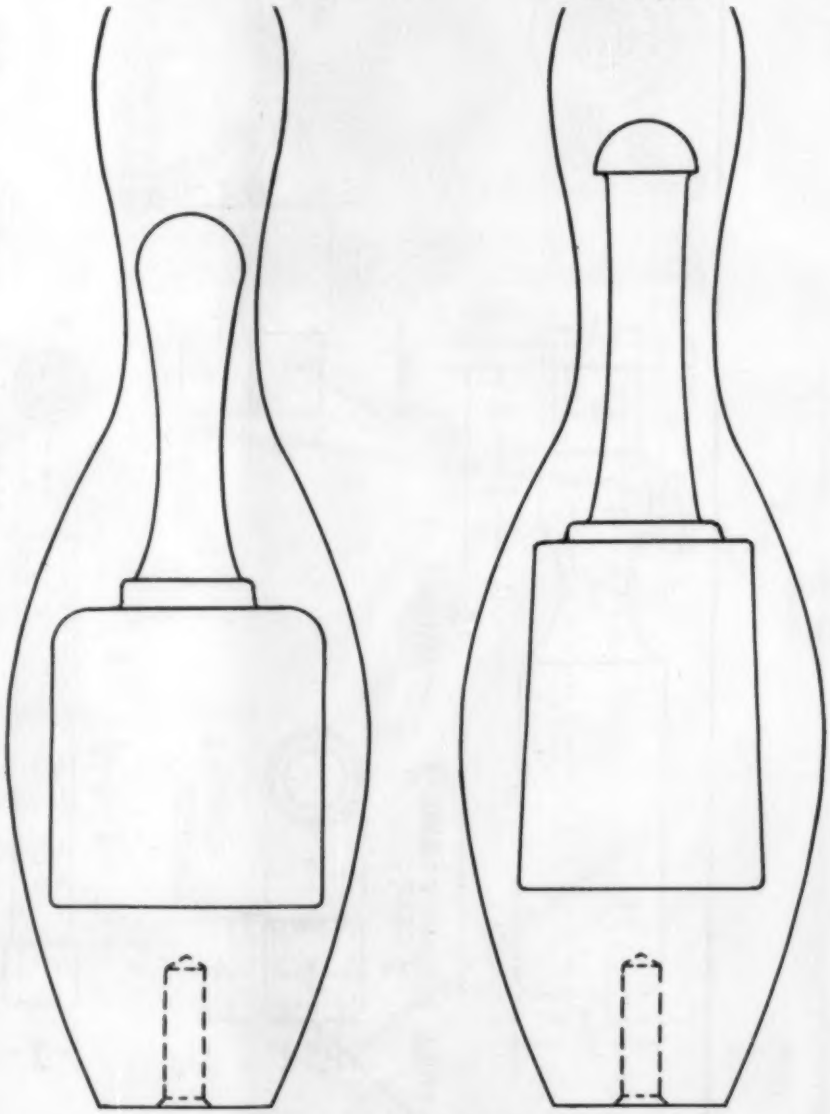
STEWART E. BAKKEN
Fargo, N. Dak.

Very serviceable, lightweight carving mallets can be made from old discarded bowling pins, which any bowling alley will give you for the asking.

The shape of the mallet is not important. Make it any size and shape desired within the limits imposed by the shape of the bowling pin. Turn the pin down until all splinters and cracks are removed before



Carving mallets from old bowling pins



Utilizing old bowling pins

shaping the mallet, as all discarded pins are cracked and splintered to some extent. Shape the handle so it will fit your hand comfortably. The accompanying illustrations show two possibilities. Each of the mallets weighs 9 oz.

The mallets shown were turned on a metal turning lathe operating at its fastest speed, using a three-jaw chuck to hold the small end of the pin and the dead center supporting the large end. Have the cutting tool sharp. A wood lathe would be preferred for this turning operation.

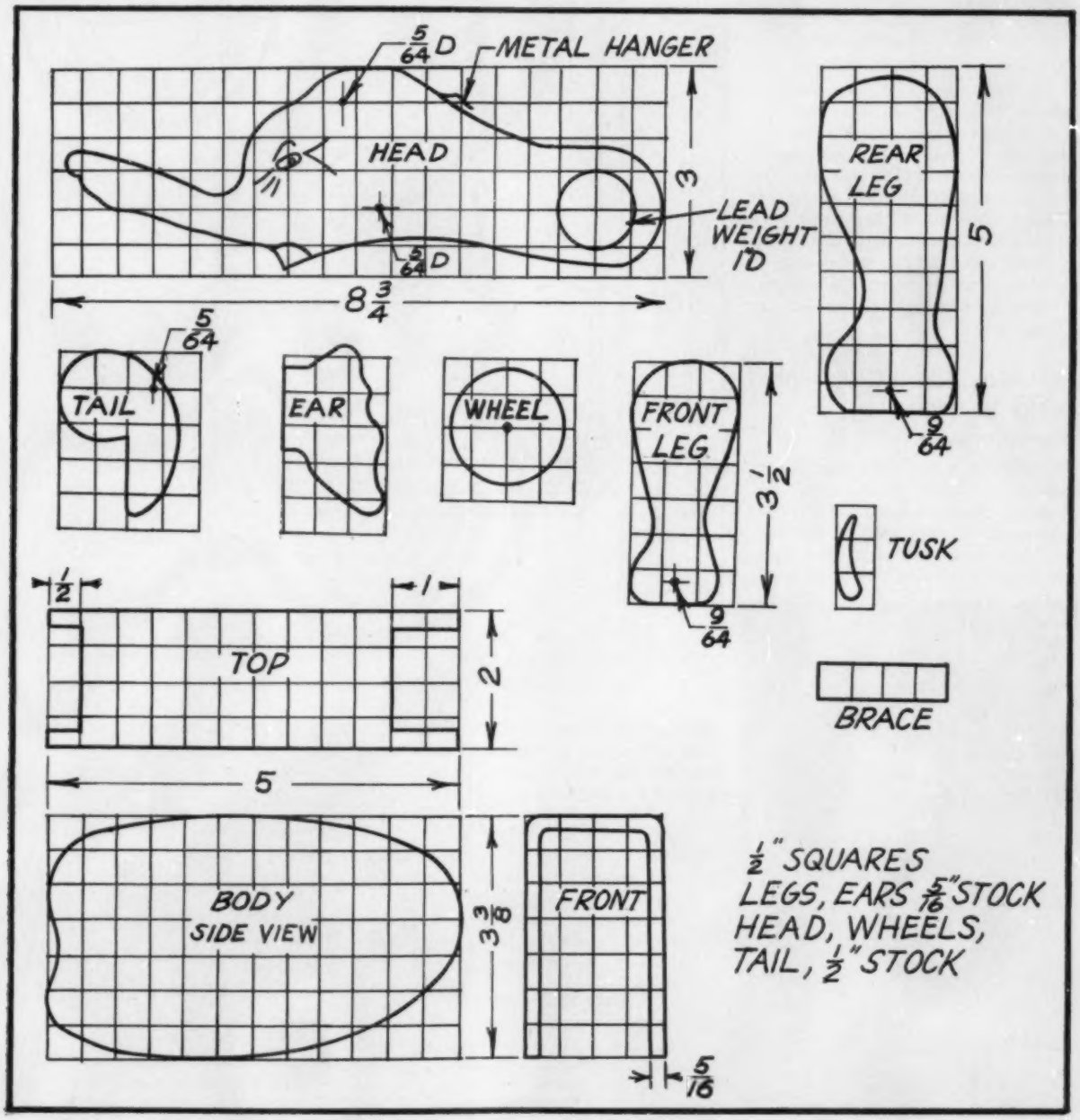
Give the mallet a coat of linseed oil and it is ready to use.

Japanese toy elephant

JAPANESE TOY ELEPHANT

CAPT. ROBERT W. INNIS
On-The-Job Training Staff Officer
Castle Air Force Base, Calif.

The toy elephant pictured is one of numerous Japanese handmade toys which are popular with families of servicemen stationed in Japan. Elephants similar to this one can be found on sale in nearly all Japanese toy shops. The children like them because, when moved, they nod their heads,



Details of the Japanese toy elephant

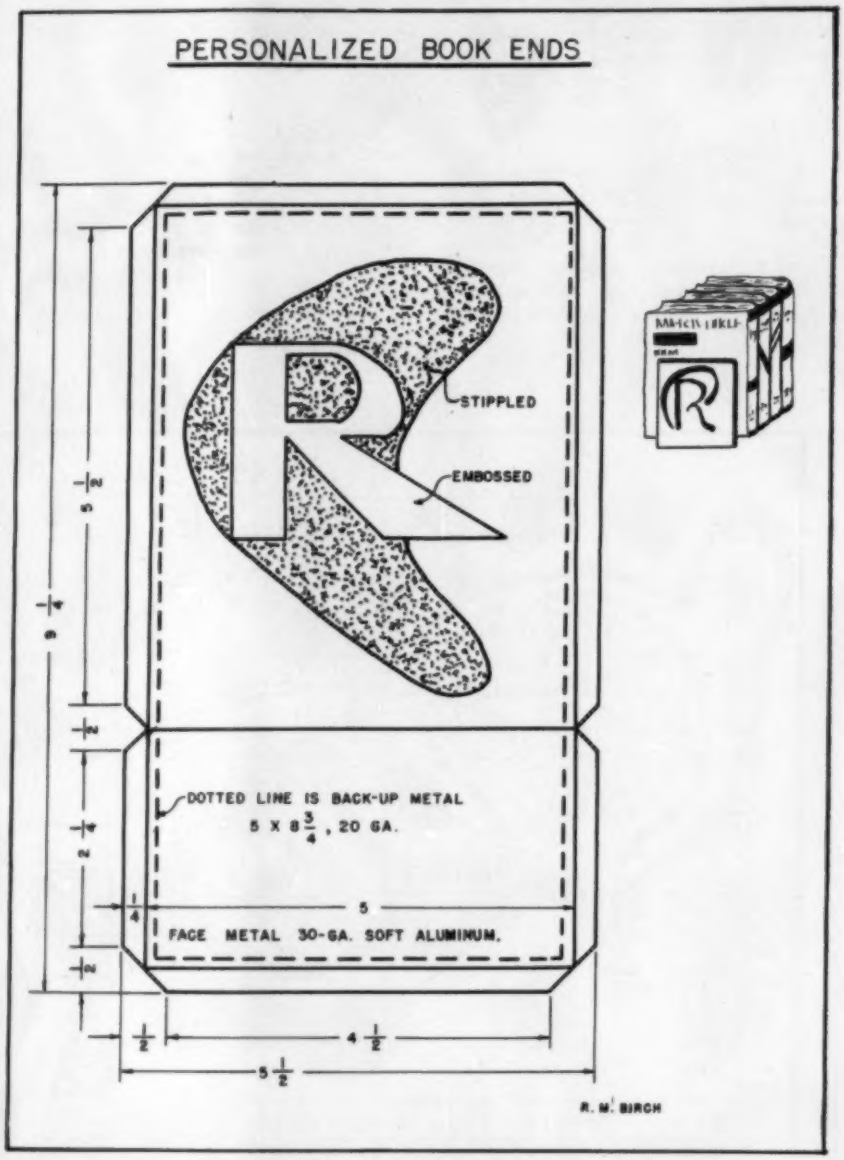
wave their ears, and wag their tails. The toys are usually made of soft wood and are highly decorated with many combinations of bright colored paints. The legs may be fastened in place with either glue or small brads. The head is hung on the body so it balances and nods when moved. The ears are fastened to the head with brads which pass through the eyes of small cotter keys. Wheel axles and tail pin are made of heavy wire. The toy is easy to construct and makes an excellent gift for 4–8 year old youngsters.

PERSONALIZED BOOK ENDS

RICHARD M. BIRCH
Mechanicsburg, Pa.

The need for an embossed type of book end led to the design of this project. The face metal of soft aluminum lends itself to embossing but does not have the rigidity to hold books. To counteract this a piece of galvanized steel is used as a back plate to give strength to the aluminum. The students in the author's classes have received this project with a great deal of interest and enthusiasm.

Personalized book end



Development of the personalized book end by Richard M. Birch

Bill of Material

Two pieces of 5½ by 9¼ in. No. 30 gauge soft aluminum; two pieces of 5 by 8¾ in No. 20 gauge galvanized steel; No. 2/0 steel wool; white shoe polish; carbon paper; graph paper; metal polish; soft cloth; newspapers.

Tools and Equipment

Pencil, scriber, tin snips, vise, ⅜ in. dowel 4 in. long, wood mallet, assorted metal stakes, combination square.

Procedure

1. Create a design on graph paper.
2. Sharpen one end of dowel rod in pencil sharpener.
3. Sharpen other end to a chisel point.

Back Plate

1. Select a piece of 20-gauge galvanized steel 5 by 8¾.
2. Scribe a line 2¾ in. from one end.
3. Bend metal at a right angle on the line.
4. Follow the same procedure for other back plate.

Face Metal

1. Select a piece of 5½ by 9¼, 30 gauge soft aluminun.
2. Coat metal with white shoe polish.
3. Place carbon paper over metal.
4. Trace design on metal.
5. Draw all other layout lines *in pencil.*
6. Cut corners and bend notch.

7. Lay metal on several layers of newspaper. Have design face up.
8. Trace over design outline with dull pencil until metal raises slightly on reverse side.
9. Retrace outline with sharpened end of dowel.
10. Repeat until outline is smooth and well defined.
11. Turn metal with face down on the papers.
12. Use chisel end of dowel and gradually push and rub until design is raised.
13. Repeat until raised section is smooth and well defined.
14. Turn metal with face up on a hard smooth surface.
15. Retrace outline with sharpened end of dowel to keep outline clear and design in the original plane.
16. Bend metal at right angle 3 in. from bottom.
17. Place face metal on back plate.
18. Bend ¼-in. tabs of face metal over back plate.
19. Set tabs down firmly with mallet.
20. Stipple background.
21. Clean metal thoroughly.
22. Polish.
23. Follow the same procedure for the other book end.
24. If you choose to paint the background: (*a*) Clean metal thoroughly. (*b*) Stipple background. (*c*) Lacquer stippled area. (You may wish to stop here and omit *d*.) (*d*) Steel wool stippled area to highlight aluminum. (*e*) Polish.

Book end in photograph made by Terry Pass, grade eight, Cumberland Valley High School.

Photograph by Robert Hare, senior, Cumberland Valley High School.

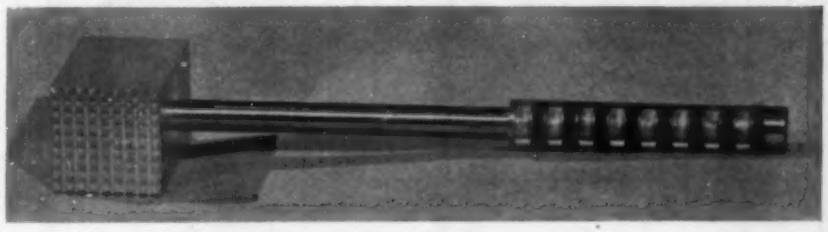
STEAK HAMMER

HAROLD V. JOHNSON
Machine Shop Instructor
Canton Senior High School
Canton, Ill.

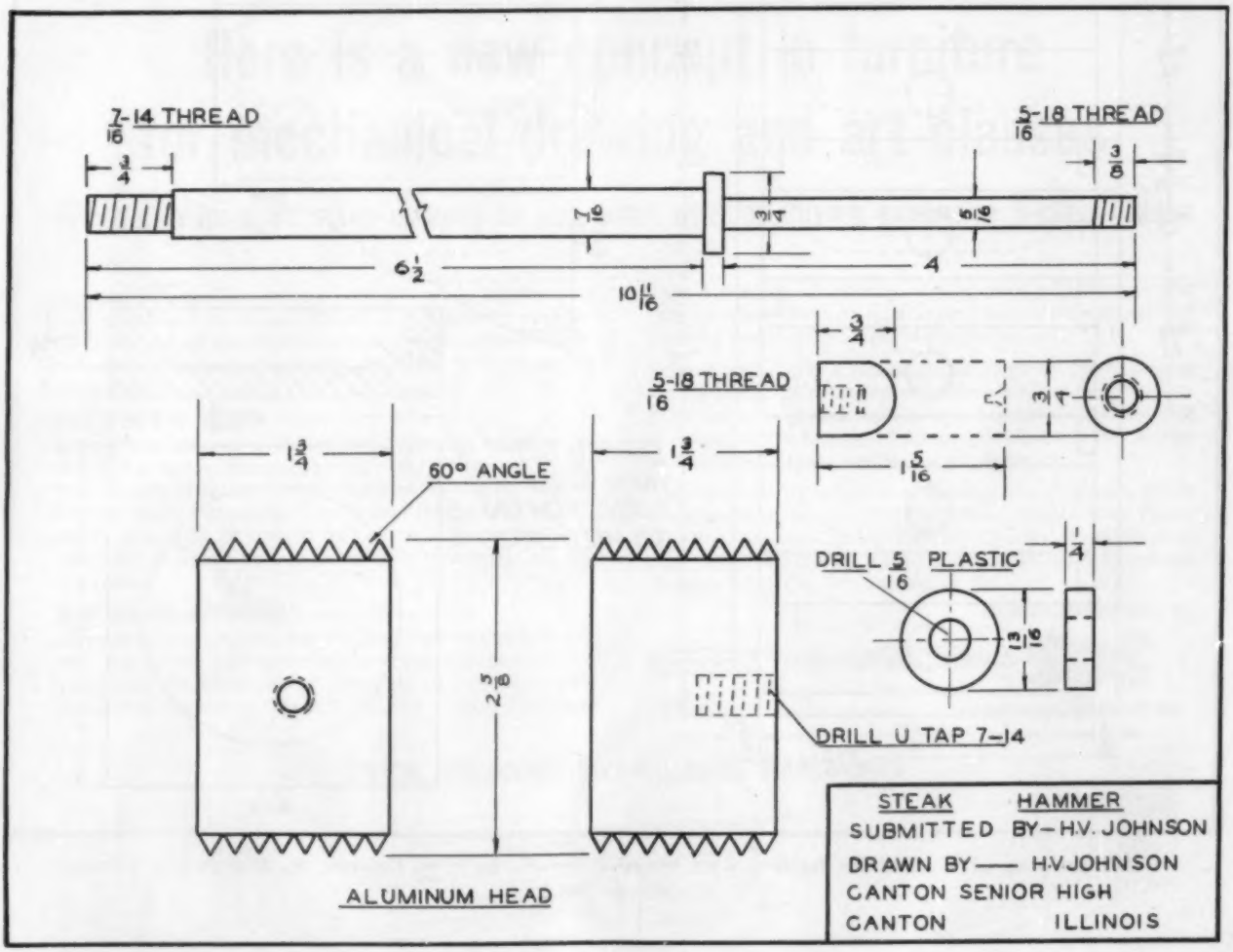
List of Material

No. of Pieces	*Material*	*Size*
1	Aluminum	1¾ x 1¾ x 2⅝ in.
1	Cold rolled steel	¾ x 11 in.
1	Cold rolled steel	¾ x 1 5/16 in.
12	Disks	1 x 1-in. dia. x ¼

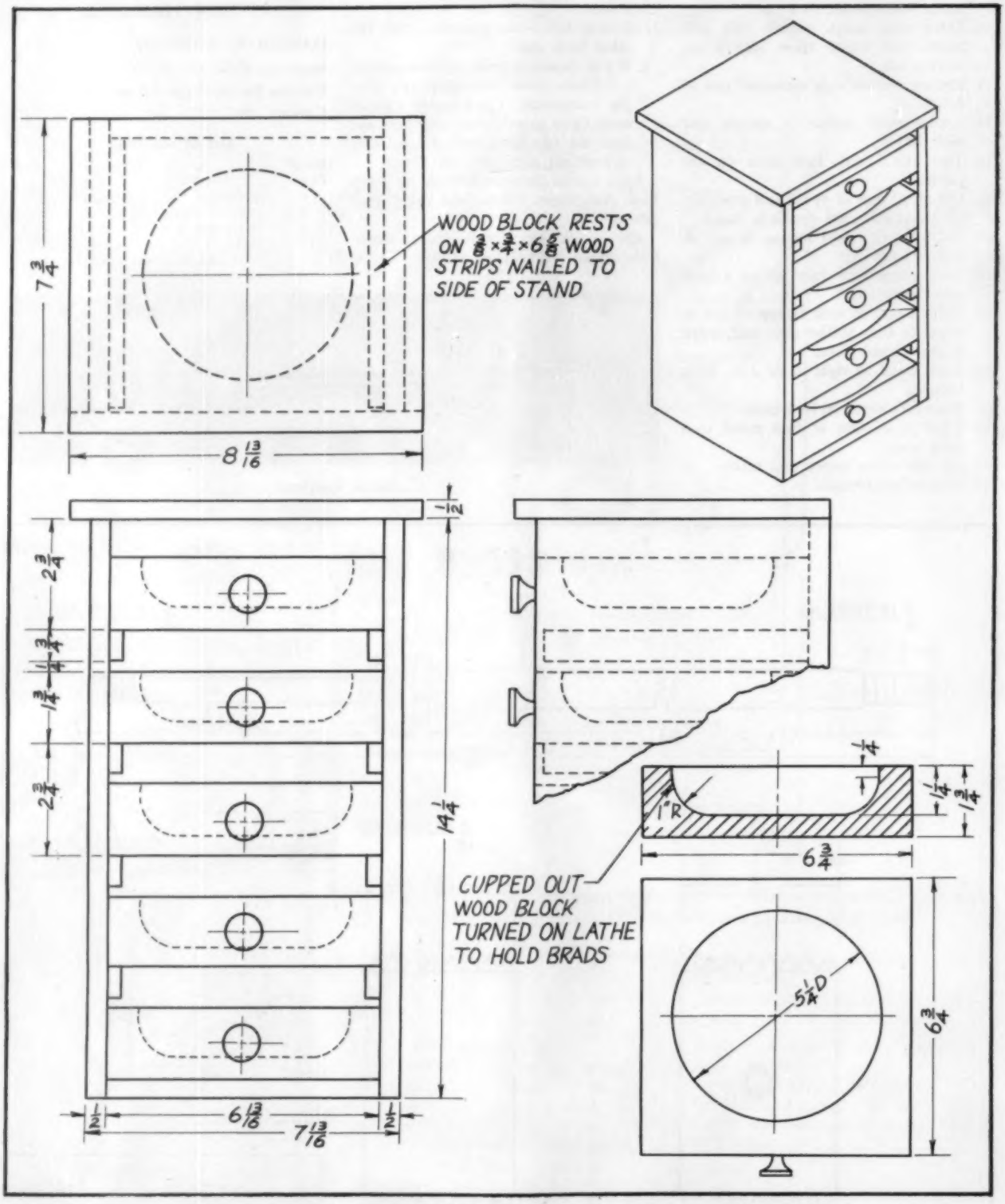
(Continued on page 14A)



Steak hammer



Details of the steak hammer



Detail drawing of a stand for holding wire brads and nails, by F. N. Newton, Jr., Sharon City Schools, Sharon, Pa.

Model 1055 Drawing or Art Table
Size of top, 42 x 30 x 1¼ in. Height of work surface, 41¼ in. at back, 37 in. at front. Legs and braces are of anodized satin-finish, heavy extruded aluminum tubing. Top is close-grained laminated hardwood with a metal U channel flush mounted at each end. Drawing board cabinets are of all-welded steel with box flange construction. They have built-in separators for storing 12 drawing boards. Model 242 stool is shown with units.

Here is a new concept in furniture for mechanical drawing and art classes

—you can have as many classes as you want without buying expensive 6-class tables

SPS has developed an entirely new concept in furniture for mechanical drawing and art classes—a combination of drawing tables, drawer and drawing board storage units which permits great versatility in number of classes without buying extra tables.

HERE'S HOW IT WORKS

A student is assigned a drawer and a drawing board at the start of a semester. These are stored in the service unit. At the start of each class, the student removes his drawer and his drawing board and carries them to his drawing table. At the end of each class, he returns both items to the service unit. The table at which he was working is then ready for the next class.

HERE ARE ITS ADVANTAGES

Only one drawer and one drawing board are at a table at any time. No drawer tiers and drawing board storage units are hung from the underside of the table to limit leg room. Classrooms are neater. There is no clutter under the table. Less possibility of pilfering or tampering with drawers and their contents. The individual student has his own drawer and drawing board safely stored in the service unit.

Schools with 2, 3 or 4 classes per day need not buy expensive 6-class tables. Schools with six classes per day need not buy extra 6-class tables for night classes. All they do in either case is determine the number of classes per table and buy service units to meet present and future requirements.

This furniture for mechanical drawing and art classes is just one element in the complete HALLOWELL School Shop Furniture line. See our Catalog 2112 for all units. Write for your copy today. HALLOWELL Shop Equipment Division, STANDARD PRESSED STEEL CO., Jenkintown 74, Pa.

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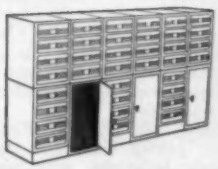
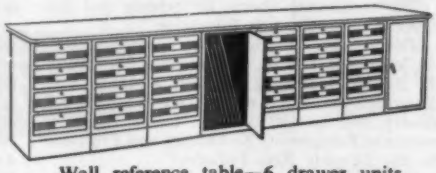
JENKINTOWN PENNSYLVANIA

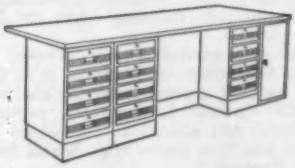
TYPICAL ARRANGEMENTS OF HALLOWELL SERVICE UNITS



2-high section of service units. Has 36 drawers, holds 36 boards.



Wall reference table—6 drawer units, 2 drawing board units hold 24 boards.



Planning table—3 drawer units, 1 drawing board unit for 12 boards.

STEAK HAMMER

(Continued from page 203)

Procedure

Handle

1. Countersink ends.
2. Place between centers and turn the 5/16 by 4-in. end.
3. Thread 5/16–18.
4. Reverse stock in lathe and turn the 7/16 diameter.
5. Cut 7/16–14 threads.
6. Turn nut to dimensions.
7. Slip the circles of plastic on the handle and screw up the nut tightly.
8. Countersink one of the nuts so that the handle can be turned between centers.
9. Turn the plastic handle to the correct dimensions.
10. Round off the end of the nut.
11. With a mill file smooth the plastic and polish with fine abrasive cloth.

Head

1. The head is made from a piece of aluminum 1¾ by 1¾ by 2⅝ in.
2. Square up the ends in the shaper or mill.
3. Grind the shaper cutter to a 60-deg. angle.
4. Shape the 60-deg. angle on each end.
5. Drill and tap the 7/16–14 threads.
6. Draw file and polish.
7. Assemble.

ASSOCIATION NEWS

(Continued from page 8A)

"Evolving Concepts of the Role of the School."

Another general session was held at 7:30 p.m., under the chairmanship of F. Gardner Boyd. At this meeting Odom Fanning spoke on "The Challenge of Technology to Industrial Arts."

At 8:30 p.m., the Ship's Program was staged. There were 69 exhibitors and since all of these firms contribute the prizes that are distributed at the Ship's Program, there was a fine selection to be given out to those who attended this meeting.

Burl N. Osburne was chosen master teacher of the year.

Thus ended an excellent AIAA Convention and all who contributed to its excellence are to be highly complimented and they are entitled to the most generous thanks of the membership.

NINETEENTH ANNUAL SPRING CONFERENCE

The Industrial Arts Division of State University of New York Teachers College, Oswego, held their Nineteenth Annual Spring Conference on Industrial Arts on May 9 and 10, 1957.

The first general session convened in the Main Auditorium on Thursday at 10:00 a.m., and featured a panel under the chairmanship of Dr. Carlton J. Gerbracht, professor of industrial arts education. The subject of this panel was "The Senior High School Industrial Arts Program."

Dr. Frank P. Johnstone, director, division of industrial education, State Education Department, served as a panel member looking at "the perspective" or long-range view.

"Industrial Arts for the College-Oriented Student" was discussed by Ivan Beams, coordinator, industrial arts department, Irondequoit.

George Reutsch, consultant in industrial arts, board of education, Rochester, treated the subject "Industrial Arts for Girls."

Dr. Gordon O. Wilber, director, division of industrial arts teacher education, Oswego, spoke on "The Challenge to Teacher Education."

An informal luncheon was held in the college cafeteria with Dr. Charles Yager acting as toastmaster, following which the commercial exhibition was conducted in the Main Gymnasium. During this time, there were laboratory demonstrations and exhibits in sixteen areas of the industrial-arts program.

The annual banquet was held at the Hotel Pontiac Ballroom at 6:30 Thursday evening with Arthur Hauler as toastmaster.

The principal address was given by Dr. M. Roy Karnes, professor and chairman, industrial education department, University of Illinois.

Also, a part of the banquet program was a testimonial to Dr. Gordon O. Wilber, retiring director of the industrial arts division at the Oswego college.

Speakers for the testimonial were Dr. R. Lee Hornbake, University of Maryland; Dr. Joseph R. Strobel, assistant commissioner, State Education Department; and President Foster S. Brown of Oswego.

Robert D. Helsby was introduced as acting director of the industrial arts division upon Dr. Wilber's retirement.

The second day of the conference opened early Friday morning with the Epsilon Pi Tau breakfast in the college cafeteria.

Dr. James Hastings was toastmaster. The breakfast was sponsored by the Oswego chapter of the national honor society in industrial arts.

At 10:15 a.m., a general session was conducted in the Main Auditorium under the chairmanship of Dr. Gordon O. Wilber.

The speaker at this session was Paul R. Leach, Jr., eastern manager, extension division, E. J. duPont deNemour and Company, who delivered an address on "Where Is Your Future?"

Friday afternoon the commercial exhibits as well as the exhibits and demonstrations in the college laboratories remained open.

A public meeting was held in the Main Auditorium at 7:30 p.m., with Dr. Foster S. Brown, president of the college, speaking on "Tomorrow's Campus."

The Industrial Arts Laboratories as well as other facilities of the college remained open throughout the evening.

32ND ANNUAL CONFERENCE ON PRINTING EDUCATION

The 32nd Annual Conference on Printing Education of the International Graphic Arts Education Association will be held July 28 to August 2, 1957, at the Rochester Institute of Technology, Rochester, N. Y.

Byron G. Culver, head, Printing Department, Rochester Institute of Technology, is the program chairman.

The conference theme is "Science and Its Place in Graphic Arts Education."

The keynote speech at the opening session on Monday, July 29, will be given by Robert E. Rossell, managing director, Research and Engineering Council of the Graphic Arts Industry, and he will talk on "Latest Developments in Equipment, Techniques and Processes in the Graphic Arts Industry."

On Tuesday morning there will be demonstrations of modern printing equipment, techniques and processes, illustrating conventional and many new developments in letterpress and lithographic offset printing, *e.g.*, 4-color web offset periodical press; automatic one-shot etching machine; Eastman 3-color short-run offset printing process; multi-metal offset platemaking, Justowriter, photosetter; teletypesetter; and Xerography.

The afternoon workshop sessions will be organized and conducted by faculty members of the various departments of Rochester Institute of Technology.

The theme of the workshops is "Integrating Science, Mathematics and Graphic Arts Education Programs."

The workshops to be conducted are: (1) the chemistry workshop; (2) physics workshop; and (3) mathematics workshop.

The theme of the general session on Wednesday morning is "New Developments in Printing Plant Operations and Their Implications in the Graphic Arts Instructional Program."

This program will include speeches on the composing room, letterpress plates, offset lithography, color printing, and the bindery.

Workshops will be conducted in the afternoon.

The theme of Thursday's program is "Photography — Its Place in the Graphic Arts Industry and in Graphic Arts Education Programs."

Harry A. Goldstein, A.P.S.A., Instructor, Tucson Senior High School, Tucson, Ariz., will be the chairman.

The entire day will be spent as guests of Eastman Kodak Company in visiting Eastman House and the Eastman Kodak plant.

A banquet and dance will be held in the evening.

Toastmaster on this occasion will be Harry A. Gage, and other speakers will be Raymond Blattenberger, Public Printer of the U. S., and Reuel Harmon, president, Printing Industry of America.

There will be workshop sessions again on Friday morning, August 2, and after luncheon there will be workshop reports, a business session, and adjournment.

Topics to be discussed at the luncheon meetings are: Monday — "How Do New Developments in Equipment Processes and Techniques Affect the Graphic Arts Teacher and His Instructional Program"; Tuesday — "Career Opportunities for Young People in the Scientific and Engineering Phases of the Graphic Arts Industry"; Wednesday — "Coordinating Graphic Arts Research, Education and Information."

INDUSTRIAL ARTS SUMMER WORKSHOP

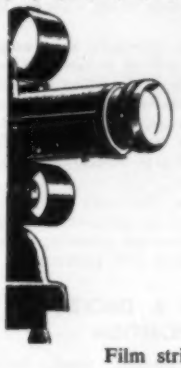
The Birch Coulee Industrial Arts Club in co-operation with the Bemidji State Teachers College and the Vocational Division of the Minnesota State Department of Education has set the dates of August 18–24, 1957, for the Second Annual Minnesota Industrial Arts Summer Workshop. The State Educational Camp on Lake Arrowhead, north of Virginia, Minn., will be workshop headquarters. Shop facilities of Virginia Public Schools will be used for instructional purposes.

The workshop will be conducted in the area of machine shop with special emphasis on the use of metalworking lathe in the general shop.

Professor O. D. Lascoe, of Purdue University, will serve as head instructor. He is director of the Machine Tool Laboratory at Purdue and is the author of many publications in the metal working field.

Reservations will be accepted. Write to *Floyd Wurscher, general chairman, Second Annual Minnesota Industrial Arts Summer Workshop, Gaylord, Minn.*

STANLEY SHOP TALK



New! Film strips on Chisels for woodworking

Another new visual aid series from Stanley Tools. This set helps teach the proper use of wood chisels.
Nine strips of 35 mm safety film in individual cans with a manual of suggested questions for testing.

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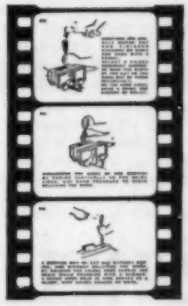
10	How A Chisel Cuts Half Lap Joints	14	Special Chisels and Gouges
		11	How To Grind And Whet Gouges



$5.00 per set, packed in a handy box, postpaid, with a booklet of suggested test questions. Use the coupon.

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Personal News

DR. NEWKIRK RECEIVES AWARD

During the recent Illinois Vocational Association Convention held at the Sherman Hotel in Chicago, Dr. Louis V. Newkirk, director, Division of Industrial Arts, Chicago Board of Education, was presented with the 1957 Illinois Industrial Education Association Award to an outstanding leader in Industrial Education. The Award was for distinguished achievement, scholarship, leadership, and professional contributions.

The presentation was made by Dr. Walter A. Klehm, head of the department of industrial education, Eastern Illinois State College, Charleston, Ill., an immediate past president of the Illinois Industrial Education Association.

Dr. Klehm presents the Award to Dr. Newkirk

LAWRENCE SECREST HEADS DEPARTMENT

Professor Lawrence C. Secrest has been selected to head the Industrial Arts Department at Northern Illinois State College, DeKalb, Ill.

Mr. Secrest came to Northern as a metals instructor in 1942 when the department was relatively small. During the following years the various departments, under the guidance of Milo T. Oakland, expanded their facilities and the significance of Northern as a leading program in industrial-arts education spread throughout the country.

At the present time, Professor Secrest, in addition to his duties as department head, teaches electricity, laboratory planning, driver education, and industrial-arts philosophy.

DR. HOWARD S. DECKER IN NEW POSITION

Dr. Howard S. Decker, head, industrial-arts department, West Virginia Institute of Technology, Montgomery, W. Va., has assumed the position of Director, Division of Arts and Sciences at the college. The newly created division consists of the departments of art, biology, chemistry, home economics, industrial arts, and printing management. The change became effective February 1, 1957.

DEGREE GRANTED TO DR. WIGEN

Ray A. Wigen, director of graduate studies at Stout State College, Menomonie, Wis., was granted the doctorate of philosophy at the March commencement of the University of Minnesota.

Dr. Wigen had previously earned two other degrees at the University of Minnesota. He received his bachelor of science in 1930 and his master of arts in 1933, the year he came to Stout after heading the industrial-arts department of South Saint Paul High School.

The title of Dr. Wigen's dissertation is "Technical Offerings for Industrial Arts Teachers at the Graduate Level." His major adviser for the doctorate has been Professor W. J. Micheels.

Dr. Wigen is at present a member of the Wisconsin Co-ordination of Higher Education Committee. He has been president of both the Minnesota and the Wisconsin Industrial Arts Associations. In 1945 he was vice-president of the Wisconsin Vocational and Adult Education Association.

Other responsibilities which Dr. Wigen has discharged include nine years of cochairmanship of the industrial-arts section of the Wisconsin State Curriculum Committee, and membership on the national research committee of the National Association of Industrial Teacher Educators.

In connection with his work on the various committees Dr. Wigen has also coauthored several important industrial-arts bulletins widely used by industrial educators throughout Wisconsin and Minnesota.

M.I.T. HEAD AWARDED MEDAL

Dr. James R. Killian, Jr., president of the Massachusetts Institute of Technology, was recently awarded the Public Welfare Medal by the National Academy of Sciences.

The medal, generally recognized as the most distinguished of the academy's medals, is awarded for the application of science in the public interest.

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Better Machine Tools for Teaching
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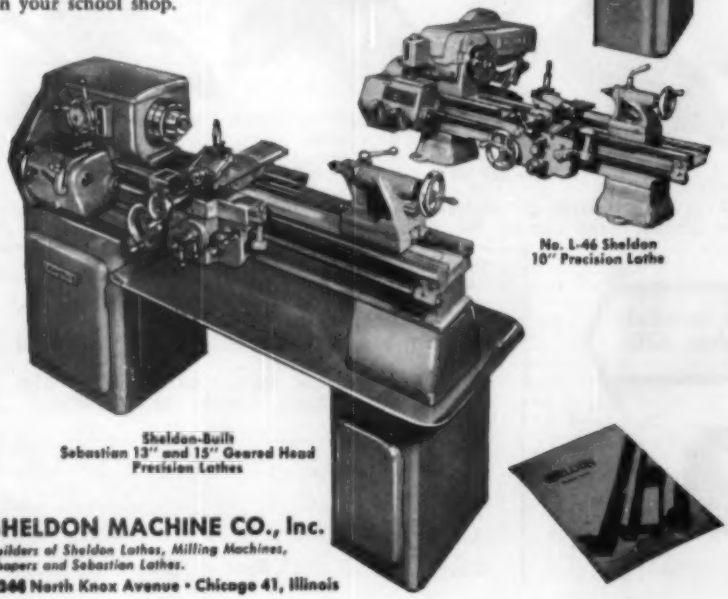

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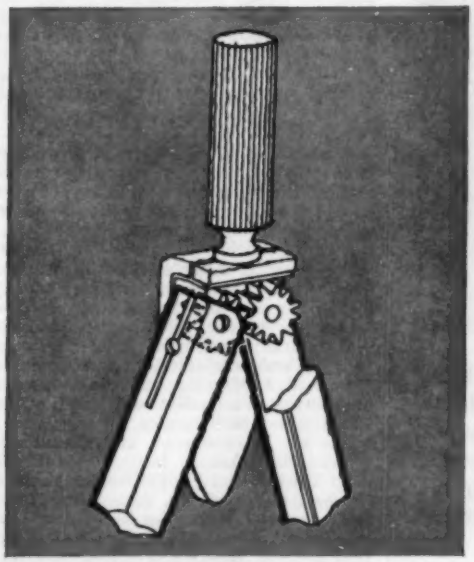
New gear head straightening device provides smoother action, replaces on the spot



Cutaway view of Post's exclusive gear head straightening device. By simply removing a screw in the head, gears can be replaced.

In selecting student instruments, you look for proper weight and balance, good tension and rugged materials. These are the obvious things, but quality consists of *hidden* features, too.

Post meets these requirements, then goes a step further. Inside the head of Post compasses and dividers is a straightening device made of two steel gears, fitted to exact precision. These gears permit easy manipulation while maintaining the head exactly perpendicular to the working surface.

Many brands of drawing instruments have no straightening device at all. Those brands that do have similar gear-type construction build it into the instrument *permanently*. This means that when the gears show wear, the leg or entire instrument must be replaced.

With these Post instruments, however, worn gears are easily replaced on the spot by simply removing a screw in the head. No special tools are needed. This exclusive Post feature saves money by doubling the life of the average instrument.

Compare Post quality dollar for dollar. Order sample instrument sets on 90 day approval. Write the Educational Division, Frederick Post Company, 3648 N. Avondale Avenue, Chicago, 18.

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1144 – "Techmaster" Set
Contains: 4½" ruling pen; 4" side adjustment circular spring bow divider; 4" side adjustment circular spring bow combination pen and pencil; 5¼" divider with gear-type straightening device; 5¼" compass with gear-type straightening device, lengthening bar and interchangeable pen, pencil and divider parts. Each set includes an extra ruling pen handle, adjusting key and lead box. School price $5.33.

1130C – "Draftmaster" Set
Contains: one 4½" and one 5¼" ruling pen; 4" center adjustment. circular spring bow divider, bow pencil and bow pen; 6" divider with straightening device and removable points; 6" compass with lengthening bar and interchangeable pen, pencil and divider parts. Each set includes extra ruling pen handle, lead box, and a well stocked kit of replacement parts. School price $10.35.

News Notes

TWENTY-FIFTH ANNIVERSARY OF VOCATIONAL EDUCATION IN PUERTO RICO

March 26–30 were the days set aside for the celebration of the Silver Anniversary of Vocational Education in Puerto Rico. To appreciate the true significance of this occasion, one must realize the direct relationship between "Operation Bootstrap" and education on this Island. Operation Bootstrap is the title given to a relatively new economic venture which features many attractive incentives for the establishment of new business. Cement, chemical, mining, and other industries are moving into Puerto Rico. Another inducement for industry is the availability of trained workers.

The vocational program of Puerto Rico, under the directorship of L. Garcia Hernandez, compares very favorably with the vocational programs within the Continental U. S. One of the largest vocational schools is the Metropolitan Vocational High School in San Juan. Too, there are vocational courses operating in the smaller areas. Courses from barbering to bricklaying are offered.

Under General Supervisor F. Rossy, the industrial arts programs are offered to over 35,000 pupils by 401 teachers. These teachers are now trained at the University of Puerto Rico under the guidance of Condi Marin. The program is highly endorsed by the school principals and district superintendents all over Puerto Rico.

The teachers, supervisors, and teacher educators met to review, discuss, and plan for the future. Meetings were held in schools, hotels, at the University and covered all ranges of vocational, and industrial arts education. Enthusiasm of all participants ran high and the meeting was most productive and beneficial to all attending.

Part of the ceremonies included the awarding of prizes to winners of the Ford Award Contest and the First Anniversary Banquet of the Theta Field Chapter of Epsilon Pi Tau, held at the new million dollar International Airport at Isla Verde.

Guest speaker for the evening was Dr. R. L. Thompson of New York University whose subject was "Practical Research In the Curriculum Area of Industrial Arts Education."

Present during the Convention and at the banquet were: L. G. Hernandez, Director of Vocational Education in Puerto Rico; A. Figueroa, General Supervisor T. & I.; F. Rossy, General Supervisor of Industrial Arts; I. V. Brau, General Supervisor of Vocational Agriculture; C. Marin, Director, Industrial Arts Department of University of Puerto Rico; Dr. James Pierson, Asst. Commissioner of Vocational Education from U. S. Office of Education; W. Williams, Florida State Director of Vocational Education; Dewey Barich, Director of Ford Industrial Arts Awards Program and Jack Faber, Advertising Manager, INDUSTRIAL ARTS & VOCATIONAL EDUCATION magazine.

THE UNIVERSITY OF MICHIGAN ANNOUNCES SCHEDULE

The University of Michigan, Ann Arbor, Mich., has announced the schedule of conferences and institutes for teachers of vocational education and practical arts subjects to be held during the school year 1957–58.

A number of different units in the University are co-operating in the planning of these conferences. Included among them are the Extension Service, the Department of Wood Technology in the School of Natural Resources, the Departments of Engineering Drawing and Mechanical Engineering in the College of Engineering, and the Department of Vocational Education and Practical Arts in the School of Education.

The list of conferences and institutes includes: Fifth Annual Institute for General Shop Teachers and Fifth Annual Institute for Teachers of Woodwork, November 9, 1957; Fifth Annual Institute for Teachers of Auto Mechanics, March 15, 1958; Sixth Annual Institute for Drafting Teachers and Sixth Annual Institute for Machine Shop Teachers, March 29, 1958; and Sixth Annual Conference for Teachers in Driver Education, April 19, 1958.

COLORADO STATE UNIVERSITY

The State Board of Agriculture by authorization of the Colorado General Assembly announces a change in the name of Colorado Agricultural and Mechanical College to Colorado State University, Fort Collins, Colo., effective May 1, 1957.

Concurrently with the change in name, the undergraduate schools at Colorado State University are redesignated the Colleges of Agriculture, of Engineering, of Forestry and Range Management, of Home Economics, of Science and Arts, and of Veterinary Medicine.

WESTMAR COLLEGE SPONSORS CONFERENCE

The Industrial Arts Department of Westmar College, LeMars, Iowa, sponsored its Annual Industrial Arts Conference on Saturday, April 13, 1957, for teachers of industrial arts in northwest Iowa, southeast South Dakota, and

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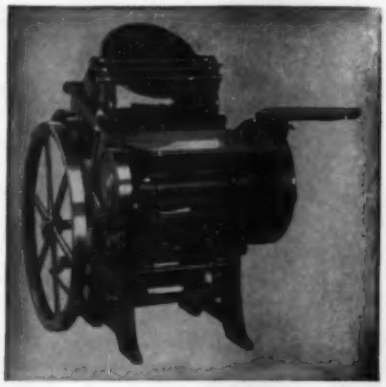

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northeast Nebraska. Fifty-two teachers spent the day on the Westmar Campus.

Professor Eldon Danne, head of the department at Westmar, planned the program with the help of the senior students majoring in the department.

The theme of the program was "Teaching Problems in Industrial Arts."

The high light of the program was the main speaker of the day, Dr. Ira H. Johnson, head of the Industrial Arts Department at Mankato State Teachers College, Mankato, Minn., whose topic was "New and Neglected Areas in Industrial Arts."

Other participants on the program were: C. J. House, Southern State Teachers College, Springfield, S. Dak.; Stanley Bentall, Sioux City, Iowa; Vernon Chance, Britt, Iowa; Bill Wendlandt, Spencer, Iowa; Professor L. L. Kruwell, Westmar College; and Tony Bruno, Sioux City, Iowa.

New Publications

Alternating Current Fundamentals

By Joseph J. DeFrance. Cloth, 262 pp., 5⅞ by 8⅝ in., illus., $4.50. Prentice-Hall, Inc., New York, N. Y.

This is the second edition of this text. This new edition, the original material which was specifically written for students of electricity, has been enriched by a goodly amount of information on power electricity such as measurement of power, reactive volt-amperes, three-phase systems (balanced), power in three-phase systems and unbalanced three-phase loads.

Automation: Its Purpose and Future

By Magnus Pyke. Cloth, 191 pp., 5½ by 8½ in., illus., $10. Philosophical Library, New York, N. Y.

A description of the electronic computer, which can automatically perform much of what formerly was done by large groups of clerks, mechanics, etc., in offices and shops. The book gives some idea of what automation may mean to our country and the world at large.

Blueprint Reading

Prepared by Chief of Naval Air Technical Training and Bureau of Naval Personnel. Cloth, 242 pp., 5⅜ by 8 in., illus., $3. Arco Publishing Co., Inc., New York, N. Y.

This book was written to meet the needs of technicians, teachers, and students whose duties require the reading of blueprints.

It contains 15 chapters which treat the subject as follows: making and handling of blueprints; blueprint views; lines and sections; dimensions; title blocks, numbers, and bills of material; layout tools; layout geometry; laying out; curve or bend allowance; templates; developments; electrical blueprints; mechanical and piping symbols; welding symbols; architectural and structural drawings.

The four appendices contain the answers to the quizzes given in the book, fractions and decimal equivalents, sheet metal bend allowances, and set back development chart.

Wave Propagation

By Alexander Schure. Paper, 64 pp., 5½ by 8½ in., illus., $1.25. John F. Rider Publisher, Inc., New York, N. Y.

This book (Volume 11 in the Electronic Technology Series) deals with the fundamental nature of electromagnetic radiation covering the various factors involved in the make-up and transmission of electromagnetic waves, with emphasis on the propagation of these waves. Describes and illustrates wave reflection and refraction, normal tropospheric propagation and scatter propagation. Numerous diagrams to clarify all points covered with a view to practicality.

Handbook of Hard Metals

By W. Dawihl. Cloth, 162 pp., 6⅜ by 9¾ in., illus., $10. Philosophical Library, New York, N. Y.

This book is an abridged translation of "Handbuch der Hartmetalle."

It treats the subject in 14 chapters under: the metallography of hard metal, the preparation of the powder mixtures for pressing, sintering, properties of sintered hard metals, what takes place during the wear of hard metal alloys, tungsten carbide alloys, hard-facing alloys, tungsten free hard metals, the production of the initial and accessory materials, the production of the powder mixtures for pressing, shaping, and final sintering.

Antennas

By Alexander Schure. Paper, 88 pp., 5½ by 8½ in., illus., $1.50. John F. Rider Publisher, Inc., New York, N. Y.

Volume 14 in the Electronic Technology Series by Dr. Schure covers both theory and practical application; transmission lines, the basic antenna input impedance, polarization, etc., from the basic dipole, through parasitic arrays, long wire and other varieties of antennas. A special feature of the book is the thorough coverage of practical antenna types in the last chapter.

Research in Industrial Education — Summaries of Studies 1930–1955

Paper, 527 pp., 5¹³⁄₁₆ by 9⅛ in., $1.75. U. S. Department of Health, Education, and Welfare, Office of Education, Washington, D. C.

(Continued on next page)

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NEW PUBLICATIONS

(Continued from previous page)

This is a summary of studies made from 1930 to 1955. The studies covered are: administration, guidance, history and trends, instruction, supervision, surveys, teacher education, and types of programs.

Energy

By Sir Oliver Lodge F.R.S. Paper, 64 pp., 5½ by 8½ in., illus., $1.25. John F. Rider Publisher, Inc., New York, N. Y.

This is a modernized reprint of a book originally written by the English physicist, Sir Oliver Lodge. It is well written, and will appeal to the layman as well as students of scientific subjects, engineers, technicians, etc. It contains practically no mathematics, yet the author explains complex ideas with word pictures relating them to daily experiences, so that the subject is made completely understandable and at the same time utterly fascinating. Illustrations have been added to dramatize and emphasize important concepts.

Electricity and Magnetism

By J. Newton. Cloth, 613 pp., 5 5/16 by 7¾ in., illus., $10. Philosophical Library, New York, N. Y.

This is a comprehensive covering of the subject. The author has added a chapter on electrostatics and one on introduction to magnetism to the chapters on current electricity. He has also added an introduction to the metric-kilogram-second system of units, since the use of this is becoming more common.

The 18 chapters present the material under the following headings: introduction of electrostatics and magnetism, the electric current, electrical power resistance, d.c. measurements, electrolysis and voltaic cells, electromagnetism, electrodynamics, electromagnetic induction, a.c. machines, capacitance, further electrostatic theory, magnetic properties of materials, terrestrial magnetism, thermoelectricity, units and dimensions of electrical quantities, the physics of the atom, photo cells, and tubes.

Practical Radio and Electronics Course for Home-Study

Prepared under the direction of M. N. Beitman. Paper, 265 pp., 8⅛ by 10⅝ in., illus., $3.95. Supreme Publications, Chicago, Ill.

This is the fourth edition of this course. The lessons have been completely revised. The 35 lessons which this book presents, describe what makes up the radio receiver, the mechanics of the radio, its mathematics, resistor circuits, coils and transformers, L. C. and R. combined circuits, how the meters work, the vacuum tubes, power supplies, audio amplifiers and accessories, radio frequency and voltage amplifiers, detection, receiver circuits, electronic oscillators, radio transmitter circuits, lines, antennas and radiation, test equipment, electronic test equipment, Thyratron tubes, photo cell equipment, radio compass, high frequency heating, electronic shaping circuits, aircraft direction finders and beacons, electron microscope, electric strain gauges, film thickness gauges, surface analyzer, facsimile equipment, intercommunicators, sound-level meter, radio servicing technique, servicing printed circuits, and practical facts about transistors.

(Continued on page 22A)

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- **FINISHING WOOD FLOORS**
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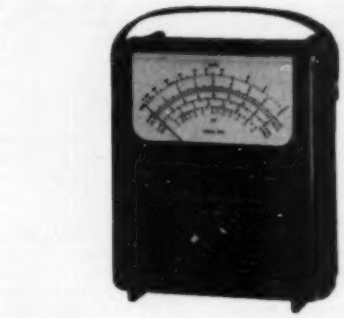

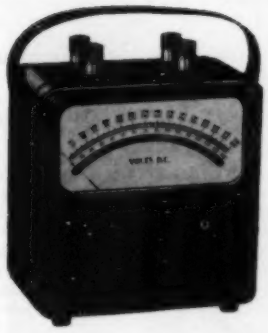

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- ☐ Circuit analyzers
- ☐ Panel and Portable instruments

NEW PUBLICATIONS

(Continued from page 20A)

Radiation Safety and Major Activities in Atomic Energy Programs — July–December, 1956

Paper, 396 pp., 5⅞ by 9¼ in., illus., $1.25. Superintendent of Documents, Government Printing Office, Washington 25, D. C.

A very extensive report on internal activities, domestic industrial programs, and special report on radiation safety is contained in this voluminous report.

The report also contains information on the domestic and foreign production, procurement, and exploration of raw materials, and data about special nuclear material and military application.

Seafarers and Their Ships

Prepared by the Ministry of Transport and Civil Aviation and the Central Office of Information. Cloth, 96 pp., 5½ by 8⅛ in., illus., $3.50. Philosophical Library, New York, N. Y.

This is an interesting story of maritime progress in the space of the past century, made possible by the passage of humanitarian laws which made crimping, overloading, defective construction, and lack of training unlawful.

The three parts of the book treat of the safety of ships, conditions of life at sea, and safety off the shores of Britain.

The First 150 Years

By Kendall B. Taft and 27 others. Cloth, quarto, 242 pp., price, $7.50. John Wiley & Sons, Inc., New York 16, N. Y.

The history of the publishing house of Wiley begins with Charles Wiley who, between the years 1817 and 1826 carried on a combination enterprise of book selling, importing, printing and publishing. The firm published only one technical book, a practical brewers' and tanners' handbook, but issued the most important works of such writers as James Fennimore Cooper, Washington Irving, Fitz-Greene Halleck, William Cullen Bryant, and others. John Wiley, from whom the present company takes its name and who succeeded his father in 1826, continued to import the works of leading British authors and published both literary and technical works. The most important literary period was from 1837 to 1848, when George Haven Putnam was a partner and when a strong list of works under the general title of "Library of American Books" was produced. The firm's authors then included such men as Nathaniel Hawthorne, Bryant Taylor, Herman Melville, William Makepeace Thackeray, and a few of Charles Dickens' best loved books.

After the middle of the nineteenth century, the firm's work slowly but surely was directed to scientific and technical books and its story cannot be told in a coherent, unified way. Its story since 1856 is really that of separate, almost completely independent departments in such fields as geology, mineralogy, architecture and building, engineering in several branches, chemistry, electricity, and its newest applications, agriculture, vocational and home-economics education, etc. The several stories — just 25 separate accounts — parallel not only the growth of American science and technology but reflect many of its basic achievements and characteristics. We Americans always have been practical people and have rarely sought purely theoretical or scientific knowledge for its own sake. We have looked for use values and material results in the researches and discoveries of our scientists, our professors, our inventors. Wiley books as the several departments of the firm's editorial staff and their expert advisers tell the story of the Company's lists, strongly parallel this practical character of American advances in the several technical fields.

In this book the story of John Wiley & Sons is told with more restraint and modesty than publishers are usually credited with. Best of all, the members of the firm who draw together the scattered strands of the story, point with modesty to past accomplishments only in the hope of seeking greater advances and better service to America in the future. May they succeed.

Vocational and Professional Monographs — The Pharmaceutical Industry

By John O'Neill Closs. Paper, 28 pp., 6 by 9 in., illus., $1.

Cartography (Map Making)

By Hubert A. Bauer. Paper, 32 pp., 6 by 9 in., illus., $1.

Philanthropic Fund-Raising as a Profession

By David M. Church. Paper, 30 pp., 6 by 9 in., $1.

The Restaurant Business

By Walter O. Voegele. Paper, 36 pp., 6 by 9 in., illus., $1.

The above named brochures belong to a series in the Vocational and Professional Monograph Series published by Bellman Publishing Co., Cambridge, Mass.

(Continued on page 24A)

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In production, extra care is taken to insure accuracy (true edges and uniform surfaces). Panel sections are bonded under high pressure by a high frequency electrical charge. Basswood end cleats, running the full length of the board, are joined by the tongue-and-groove method and then are glue bonded to the board itself for still greater strength. These advanced production techniques mean high quality, either in the popular school grade or the superbly finished professional boards.

The woodworking craftsmanship that goes into each POST board is characteristic of the entire POST line: T-squares (a full range for every budget), scales (boxwood, hardwood and plastic), precision cut triangles, curves and many other products used in classrooms and drafting departments.

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NEW PUBLICATIONS

(Continued from page 22A)

Dictionary of Dietetics

By Rhoda Ellis. Cloth, 152 pp., 5⅝ by 8⅛ in., $6. Philosophical Library, New York, N. Y.

A book containing a comprehensive set of definitions for terms and references to goods, causes of diseases, articles of diet, etc.

This book should be of great use to nurses, dietitians, institutional cooks, and chefs.

Business and Personal News

MILFORD M. HAMLIN IN NEW POSITION

Milford M. Hamlin, formerly assistant manager and Central States representative of the Department of Education, American Type Founders, joined the sales staff of Graphic Arts Equipment Company, Chicago, Ill., on April 1, 1957.

Mr. Hamlin first joined American Type Founders at its Dallas, Tex., branch, where he served in several capacities including that of traveling representative. He became associated with the Chicago branch in 1916, where he served as salesman, layout and production engineer, and during the past 18 years on the staff of the Department of Education.

His broad technical knowledge of the printing trade, and the wide experience gained while in the engineering and education departments of his former employer, should be a valuable asset to the fast-growing concern of Graphic Arts Equipment Company, and will be welcomed by many customers, both in the industrial and school fields.

NEW DISTRICT SALES MANAGER AT ROCKWELL-DELTA

James C. Stoner of the headquarters sales staff of Rockwell Manufacturing Company's Delta Power Tool Division has been appointed a district sales manager in the Illinois area, as announced by George Madeska, West Central regional sales manager.

A 1953 business administration graduate of the University of Pittsburgh, Mr. Stoner served two years in the U. S. Army before joining Rockwell in August, 1955. He has been specializing in Delta metalworking products sales work.

He will make his headquarters in Chicago.

BLACK & DECKER BUYS PLANT IN CANADA

Black & Decker Manufacturing Company, Ltd., of Toronto, announces the purchase of a Canadian manufacturing plant, in Brockville, Ontario. The company is a subsidiary of The Black & Decker Manufacturing Company, Towson, Md., world's largest maker of portable electric tools.

The Brockville plant, located 130 miles west of Montreal near the St. Lawrence River, has an area of 58,000 sq. ft. Initial manufacturing operations are expected to be under way by approximately July 1, 1957.

In addition to manufacturing operations at Towson and Hampstead, Md.; Harmondsworth, England; Melbourne, Australia; and Brockville, Canada; Black & Decker maintains 42 service branches in the United States, 9 in England, the 4 mentioned above in Canada, and 3 in Australia, and service subsidiary companies in Belgium, Union of South Africa, Mexico, and Brazil.

CHARBONNIER FILLS NEW ENGINEERING POST AT BLACK & DECKER

James W. Charbonnier has been appointed Director of Industrial and Plant Engineering of The Black & Decker Manufacturing Company, Towson, Md. This is a newly created post in the portable electric tool company, necessitated by Black & Decker's general growth.

Mr. Charbonnier will be responsible for directing and co-ordinating the company's Industrial Engineering, Tool Engineering, and Plant Engineering departments, and will report directly to Adam Quick, vice-president in charge of production.

Until his present appointment, Mr. Charbonnier was a private consulting engineer in Chicago.

DeWALT, INC., NAMES DISTRICT MANAGERS

DeWalt Inc., manufacturer of industrial and homeshop wood and metal cutting machinery, has assigned territories to three district sales managers, it was announced by Condé Hamlin, the company's president. The men involved are: J. H. Eigenberger, to the Milwaukee and Down-State Illinois territory; William F. Styer, to the Lancaster, Pa., territory; and James W. Anderson, to the Houston, Tex., territory.

Mr. Eigenberger had been DeWalt district manager in the Houston area since January of 1953. Prior to that time he held for one

(Continued on page 26A)

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BUSINESS AND PERSONAL

(Continued from page 24A)

year the same position in the Milwaukee territory to which he now returns. In addition to the immediate Milwaukee vicinity, this district encompasses the southern half of the state of Wisconsin and the northern half of Illinois, exclusive of the Chicago metropolitan center.

Mr. Styer had been Milwaukee district manager for DeWalt since August of last year, prior to relinquishing this territory to Mr. Eigenberger in order to assume the same position in the firm's Lancaster district, comprised of eastern Pennsylvania and the state of Delaware.

He joined DeWalt Inc., in March, 1955, as a demonstrator-salesman, in which capacity he served until entering the Milwaukee territory as district manager.

Mr. Anderson joined DeWalt in May, 1956, as a demonstrator-salesman. In November of last year he was named assistant to the firm's district manager in the Minneapolis territory. His current assignment to the Houston district, which includes the southern half of the state of Texas, is his first in the capacity of district sales manager.

DRUMMOND STUART NEW MANAGER IN CANADA

Drummond R. Stuart has been appointed General Manager of Black & Decker Manufacturing Company, Ltd., of Brockville, Ontario. He will be responsible for complete operations of the portable electric tool company in Canada.

The headquarters of the company which was established in Montreal in 1922, and in 1933 moved to Toronto, will now be located at Brockville.

Mr. Stuart, who was born and educated in Montreal, was general manager of the Orient plant in Brockville until his present appointment with Black & Decker. He had been with Orient for 20 years, and had also served 5 years during the war in the Royal Canadian Navy, with the eventual rank of Lieutenant Commander.

Descriptive Material

HOW TO USE SPECIAL PURPOSE PLANES

Stanley Tools, division of The Stanley Works, have published a fact-filled, 20-page booklet on various types of rabbet, router, and double-end tongue and groove match planes used by carpenters, cabinetmakers, modelmakers, hobbyists, and other craftsmen.

Profusely illustrated with line drawings showing the planes in use and the innumerable cuts that can be made with special purpose planes, the booklet will be helpful to both veteran woodworkers and beginners.

The booklet is available upon request.

(For Convenience Circle Index Code 0612)

"CARE OF DRILLS AND REAMERS"

Just off the press is another edition of Chicago-Latrobe's "Care of Drills and Reamers." This booklet is complete with technical data of using, sharpening, and handling drills and reamers whether made of high speed or carbide steel.

It contains 22 pages of two-color illustrated material with graphs and charts to help you get the most mileage out of Chicago-Latrobe drills and reamers.

A copy of this folder is available upon request.

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ANNOUNCEMENT

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Steinberg-Ford May 15

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Included also is a comprehensive discussion of past, present and future developments to be expected in electricity and electronics, as well as helpful material on career opportunities today and tomorrow.

Organization of the book: This electrical and electronic age. How electricity is produced. Electricity for everyday living. Using electricity for communication. 256 pages.

AUTOMATION IN PRACTICE

S. E. Rusinoff June 1

You'll want to see this practical survey of automatic production in the metalworking industries. Written as a basic text for vocational schools and technical institutes, *Automation in Practice* takes the mystery out of automation and furnishes for future tradesmen and technicians a factual, down-to-earth discussion of the techniques of automatic production.

Automation in Practice begins with a general discussion of what automation is, and what it means to modern industry. Following are chapters on automatic controls, pneumatic, hydraulic, and electrical and electronic control systems.

Chapters are also devoted to the use of automation in various areas of manufacture, including materials handling and assembly, the production of ferrous and nonferrous metals, metal casting, the mechanical working of metals, machine tools, heat treatment, welding, brazing, joining, and many others.

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EASTMAN KODAK BOOKLET

A new Kodak booklet, "Industrial Motion Pictures," which gives the industrial photographer the information he needs to produce low cost films plus complete data on all 16mm. Kodak motion picture films is now available.

The 76-page booklet is an optional addition to the recently revised Kodak Industrial Handbook. Although primarily designed to assist the industrial motion picture photographer, the publication also provides the serious amateur motion picture photographer with many answers to problems concerning procedures and materials in film production.

Profusely illustrated with how-to-do-it photographs, "Industrial Motion Pictures" is available from Kodak dealers for 50 cents. The complete Kodak Industrial Handbook, or any of its individual booklets may be purchased at Kodak dealers in an attractive binder.

(For Convenience Circle Index Code 0614)

AUTO RADIO SERVICE DATA MANUAL

The introduction of Volume 6 in the "Auto Radio Service Data Manual" series was announced by Howard W. Sams & Co. Inc.

This volume covers 45 auto radio chassis (78 models) of these units produced during late 1955 and 1956. It presents complete photo coverage, parts lists, alignment information, schematics, and servicing information for each auto radio. This new manual is a valuable addition to the library for all service technicians who service auto radios.

Auto Radio Service Data Manual, Volume Six (Catalog No. AR-6), contains 240 pages 8½ by 11 in. Plastic comb binding for durability. Priced at $3.95, it is sold through electronic parts distributors.

(For Convenience Circle Index Code 0615)

BORDEN COMPANY DESCRIPTIVE FOLDER

The Borden Company's Chemical Division is offering a free illustrated folder explaining the proper use of contact cements for home, office, and furniture improvement.

The folder contains detailed instructions and sketches for bonding many popular do-it-yourself materials. Simplicity and speed of installation are stressed, and the publication offers suggestions for every room in the house.

Copies of the folder are available from the Chemical Division, the Borden Company, and also through jobbers and wholesalers who handle Elmer's Contact Cement, Elmer's Non-Flammable Contact Cement, and Elmer's Cleaners & Thinners for the cements.

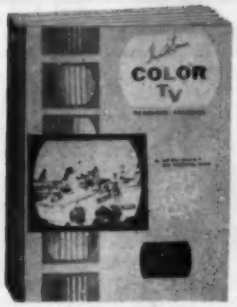
(For Convenience Circle Index Code 0616)

NEW CATALOG ON CHICAGO PRESS BRAKES

Dreis & Krump Manufacturing Company has issued a new 16-page catalog on the advanced design of the Series A, B, C, and L Chicago Press Brakes. This catalog, AL-57, illustrates and describes the principal construction features and gives complete specifications of the different sizes of brakes in the 30-, 36-, 50-, and 60-ton capacities. Also many special features that can be incorporated are described and illustrated. These special features include: wide bed and ram for large die area, extension to bed on ram for tubular and similar work, extra deep throat, extra high die space, and special controls. Two pages are devoted to Chicago induction hardened dies, both special and standard, for all makes of press brakes.

(For Convenience Circle Index Code 0617)

NOW you can add COLOR TV to your courses of instruction



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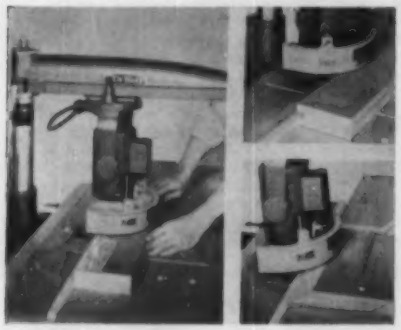
Shop Equipment News

NEW MULTI-PURPOSE TOOL GUARD

An adjustable metal guard for use with their "Power Shop" line of radial arm type woodworking machines has been introduced by DeWalt Inc., a subsidiary of American Machine & Foundry Company. The new guard can be used with a variety of accessories (saw blades, shaping heads, rotary surfacers, sanding disks, etc.) operated with the motor



New Multi-Purpose Tool Guard for use with DeWalt "Power Shop" Machines

of the machine placed in a vertical position. It is intended to supplement the function of the standard safety guard employed in operations which require the motor to be positioned horizontally.

Because of the design of DeWalt's machinery, the cutting member is suspended above the surface of the material being processed. This feature allows the guard to completely surround the moving parts of the power tool from all side approaches and across the top of the cutting head. It is virtually impossible for the user's hands to come into contact with potentially dangerous areas during normal operation.

The guard is adjustable on two vertical columns which allow for accurate positioning of the cover, to within one-eighth inch of the top surface of the lumber, regardless of its thickness dimension.

Further information will be sent upon request.

(For Convenience Circle Index Code 0601)

NEW BLACK & DECKER NIBBLER

The Black & Decker Manufacturing Company announces the addition to its product line of a No. 16 Nibbler. This new Nibbler is built for continuous production work in all types of sheet metal. It punches out small, rectangular pieces, leaving a perfect smooth edge without bending or curling the material. Operating on a punch and die principle, the tool delivers approximately 3300 high-intensity strokes per minute. It cannot be overloaded, and operates without vibration or distortion.

The new Black & Decker No. 16 Nibbler

Small, compact, and cool-running, the Nibbler is powered by a special Black & Decker-built motor which contains patented design features for durability under heavy service. The tool has sealed ball bearings throughout.

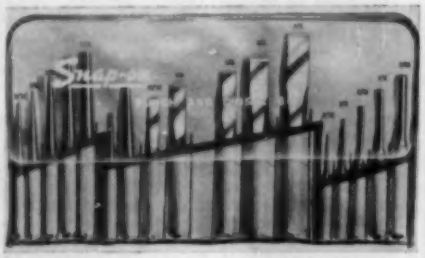
Several conveniences are featured in the Black & Decker No. 16 Nibbler. The weight is 5½ lb. The tool is available through industrial and automotive distributors.

Additional information is available upon request.

(For Convenience Circle Index Code 0602)

NEW "OCTO-SQUARE" PUNCHES AND CHISELS

Snap-On Tools Corporation have released their newly designed punches and chisels which are square shaped with beveled corners to provide a more comfortable surface for firm control, greater safety and to prevent tool from rolling out of reach.



"Octo-Square" Punches and Chisels

Special alloy steel used in the manufacture of these punches and chisels is heat-treated under controlled atmosphere for uniform hardness; chisel and punch heads are then induction drawn under electronic control to reduce hardness to the proper degree for a controlled mushrooming, long life striking surface. Chisel edges are ground to a 70-deg. angle, which provides fast cutting for all general purpose work.

These new punches and chisels are available in sets consisting of five starter punches and five drift punches $\frac{3}{32}$ to $\frac{5}{16}$ inches, five chisels $1\frac{3}{32}$ to $\frac{7}{8}$ inches, and two sizes of center punches complete in vinyl-fabric kit bags. Sizes are clearly marked on the bag for convenience.

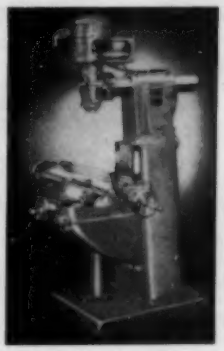
Further information may be obtained from the manufacturer.

(For Convenience Circle Index Code 0603)

VERTICAL MILLING MACHINE HAS IMPROVED FEATURES

South Bend Lathe now has in production a Vertical Spindle Precision Milling Machine with a number of improved design features which contribute to greater ease of operation, increased efficiency, and more dependable performance.

The head swivels full 360 deg. on the flanged end of the overarm for milling, drilling, or boring at any angle. A substantial key with tapered gib prevents overarm from turning in the column bearing. This permits moving head transversely without affecting angular setting of head. New vernier graduations reading in minutes and worm gear adjustment permit quick and easy setting of head angle with extreme precision. Overarm is 4½ in. in diameter, has 15-in. rack and pinion cross movement, and can be locked rigidly at any point.



Vertical Spindle Precision Milling Machine

For better stability the milling machine base has been enlarged and strengthened. Extra large dovetails provide rigid support for the table and have tight fitting scrapers to keep bearing surfaces clean. Table is 9 in. wide and is available in 32-in., and 42-in. lengths providing 20-in., or 30-in. longitudinal travel respectively.

The spindle has No. 30 milling machine taper with ¾-in. maximum collet capacity. Individual toolholders have up to 1-in. capacity. Spindle has 4-in. vertical travel with lever for rapid movement and handwheel for slow feed.

Eight spindle speeds range from 90 to 2500 r.p.m., with ¾-h.p., 1200 r.p.m. motor or 135 to 3750 r.p.m., with 1-h.p. 1800 r.p.m. motor.

Additional information is available upon request.

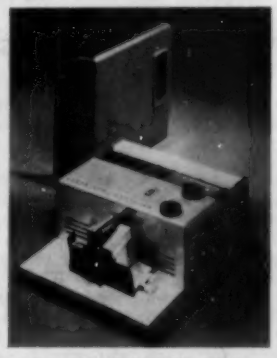
(For Convenience Circle Index Code 0604)

EASTMAN KODAK SLIDE PROJECTOR

A smartly-styled, compact new slide projector adaptable to the instructional or entertainment programs of church and school organizations is available with the introduction of the new Kodak 300 Slide Projector.

Capable of screening crisp, man-size pictures in even the smallest rooms, the projector is

(Continued on page 30A)



New Kodak 300 Slide Projector

TOLCO
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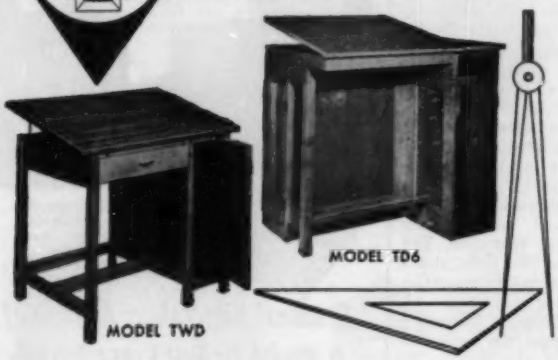

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SHOP EQUIPMENT NEWS

(Continued from page 28A)

smaller than a portable typewriter, and weighs only half as much. It was introduced at the International Photographic Exposition in Washington, D. C.

The projector is available with either of two slide-changer systems. One is the totally new Kodak Readymatic Changer which moves the slide into projection position with a rotating movement so that slides do not tend to catch on each other. Slides are advanced by a simple push-pull mechanism and replaced in the slide trough after projection.

The Kodak 300 Projector is also available with an Automatic Magazine Changer. Using this system, slides can be permanently stored and protected in individual metal carrier frames in a 36-compartment magazine. The slide advance lever positions the slide, stores it, and automatically advances the magazine to the next slide.

For further information on other important advantages of the slide projector, write to the manufacturer.

(For Convenience Circle Index Code 0605)

NEW DI-ACRO PACKAGE DEALS

O'Neil-Irwin Mfg. Co. is offering a complete metal forming area to school shops only at special savings. Three new Di-Acro Package Deals include a complete setup of Di-Acro Precision Metalworking Machines designed especially for schools.

Brake and Roller are Spartan Models, designed especially for schools. Bender, Notcher, and Shear are industry proved. Benches of heavy gauge steel are designed for efficiency and long wear. Special prices include freight to schools anywhere within continental limits of United States.

For further information on the three Package Deals, write to the manufacturer.

(For Convenience Circle Index Code 0606)

FINE-LINE MECHANICAL LEAD HOLDERS

Alvin & Company is introducing a revolutionary new Fine-Line Mechanical Lead Holder in two popular models — the standard 5¾-in. Mark-V and the Mark-VP 5-in., with spring pocket clip.

Fine-Line Mechanical Lead Holders

These pencils are efficient and economical and require no sharpening or lead pointing. They are uniquely designed to take special thin lead of .031 in. thick; precision designed for perfect balance. They are slim, trim and fit comfortably in the hand. Lightweight of less than ½ oz., they are constructed with a nonrolling hexagonal barrel.

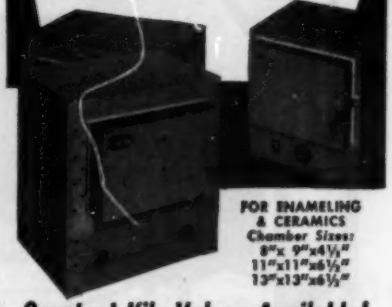
Guaranteed for workmanship and dependable service, both models come individually boxed with one dozen extra refill leads and are supplied in a choice of nine degrees of lead hardness from 3B through 4H.

For more information on these top quality Fine-Line Mechanical Lead Pencils, write to Alvin & Co., Inc.

(For Convenience Circle Index Code 0607)

(Continued on page 32A)

NOW! 3 new duo-kilns



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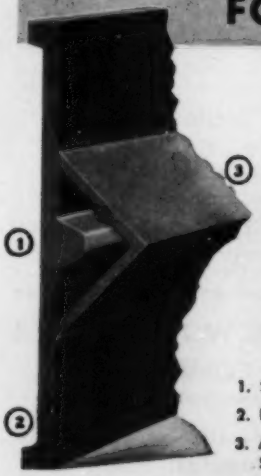

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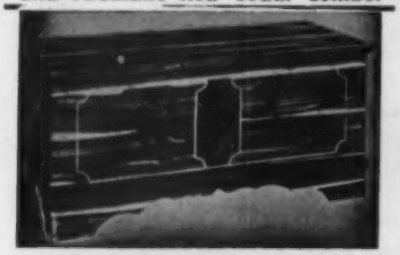

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SHOP EQUIPMENT NEWS

(Continued from page 30A)

"PARENT" ELECTRICAL BENCH

Parent Metal Products, Inc., have introduced the No. 72-30-404BLZ "Parent" Electrical Bench.

"Parent" Electrical Bench No. 72-30-404BLZ

This locker base electrical bench is 72 in. long, 30 in. deep, and 32¾ in. high. The laminated edge grain maple top is 1¾ in. thick; furnished with an all-steel wiring tunnel 72 in. long, 7 11/16 in. high, 6 in. deep, and equipped with four duplex receptacles. The base consists of two locker units of two lockers each, and one tubular steel leg with flush-fitting protective shoes. The locker size is 12 in. wide, 21 in. deep, and 15 in. high. The doors are equipped with spring hinges and padlock attachments.

A complete Industrial Arts and Vocational Shop Equipment Catalog is available by writing for a copy.

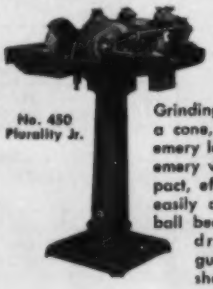
(For Convenience Circle Index Code 0608)

NEW FEATURE FOR NO. 00 TWO-TON PRESS-RITE PRESS

Sales Service Machine Tool Company, has recently designed and installed an outside bridle type clutch key spring arrangement for the No. 00 two-ton Press-Rite Press.

The new key spring eliminates the need for old type clutch springs, according to the manufacturer. The new spring increases tension allowing for faster engagement and improves spring life. As a result, greater strength, positive clutch engagement, and a minimum amount of maintenance is assured.

TOOLS ALWAYS SHARP WITH PLURALITY OILSTONE TOOL GRINDERS



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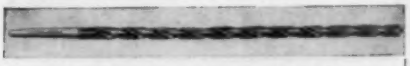
Additional information about the New Press-Rite No. 00 two-ton press will be furnished upon writing to the Press-Rite Division, Sales Service Machine Tool Company.

(For Convenience Circle Index Code 0609)

CHICAGO-LATROBE EXTRA LONG DRILLS

Extra Long Drills manufactured by Chicago-Latrobe are longer than regular drills and are recommended in the interest of service to all manufacturers.



Chicago-Latrobe Extra Long Drills

Extra Long Drills are available in high speed steel with straight shank; wire gauge sizes No. 52 through No. 1 and fractional sizes 1/16 in., through 1/2 in.

Taper Shank size range, 1/8 in. through 1 1/2 in.

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Further information and prices are available upon application.

(For Convenience Circle Index Code 0610)

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This new paper offers exceptional translucency and, by actual test, can boost print production as much as 25 per cent over other transparentized papers. In visual characteristics, Visi-Vel provides a perfect balance

(Continued on next page)

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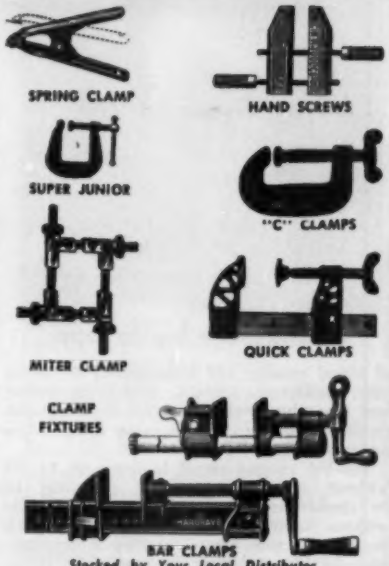

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SHOP EQUIPMENT NEWS

(Continued from previous page)

Bruning's New Tracing Paper

of visual opacity and transparency to assure easy, comfortable visibility of drawing surface and line when making original drawings and excellent visibility of underlying image when making tracings.

Visi-Vel accepts pencil hardness up to 9H without tearing or puncturing, and areas can be cleanly erased and re-erased repeatedly without damaging its drawing qualities. This paper withstands heavy handling in drawings, reproduction, and filing because of its exceptional inherent strength.

Free 8½ by 11-in. samples and literature on Visi-Vel can be obtained from the Company, or their branches and distributors.

(For Convenience Circle Index Code 0611)

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See May Issue, Page 51A
Industrial Arts and Vocational Education
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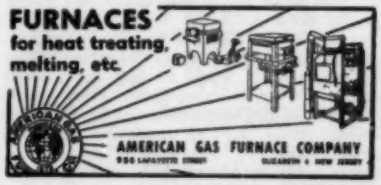

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READER'S SERVICE SECTION

INDEX TO SHOP EQUIPMENT

The index and digest of advertisements below are provided for your convenience in requesting free product information, catalogs and literature offered by the advertisers and the manufacturers listed in Shop Equipment News. To obtain this information or literature, encircle code numbers, sign the card, and mail. Your request will receive prompt attention.

Code No.		Page No.
60	**Adjustable Clamp Co...** Jorgensen and pony clamps.	10A
61	**American Gas Furnace Company** ..... Heat treating equipment.	34A
62	**American Technical Society** ..... Two important new texts.	26A
63	**Armstrong Bros. Tool Co.** Carbide insert tool holders.	31A
64	**Atlas Press Co., The....** Precision machine tools.	2A
65	**Bedford Lumber Co.....** Knockdown cedar chest & aromatic red cedar lumber.	30A
66	**Behr-Manning, Division of Norton Co.....** Finishing booklet.	20A
67	**Black and Decker Mfg. Co.** ..... Portable electric tools.	11A
67A	**Board of Examiners....** Teaching positions.	34A
68	**Brodhead-Garrett Co....** Master B-G catalog.	25A
69	**Bruce Publishing Co.** .....3rd cover Texts.	
610	**Castolite Co., The.....** Fiberglas and liquid plastics.	34A
611	**Chandler & Price Co....** Presses and paper cutters.	18A
612	**Chilton Company.....** 1957 auto repair manual.	30A
613	**Cincinnati Tool Co., The.** Complete line of tools. Free catalog.	33A
614	**Copper Shop, The.....** Enamel-on-copper idea book.	32A
615	**Craftsman Wood Service Co.** ..... Catalog of wood & wood working equipment free to instructors.	31A
616	**Crow Electri-Craft Corp..** Electri-kits. Write for detailed bulletins.	30A
617	**Delta Power Tool Div. Rockwell Mfg. Co.....** 11" metal lathe. Use coupon 9A for catalog and fact book.	9A
618	**Designers Company....** Castings for school projects.	34A
619	**DeWalt, Inc., Sub. American Machine & Foundry Co.....4A & 5A** Power saws. Use coupon 5A for free booklet.	
620	**Dietzgen Co., Eugene** .....2nd cover Drafting, purveying and printmaking equipment.	
621	**DonJer Products.....** Free catalog on pre-tested new ideas for school shop projects.	32A
622	**Driscoll & Co., Martin...** Inks.	34A
623	**Duo-Kiln Mfg. Co.....** Enameling and ceramics kilns.	30A
624	**Foley Lumber Co., T. A...** Lumber for schools.	34A
625	**Formit** ..... Tools and materials for making hand wrought iron work.	31A
626	**Gaston Finishes .....** Wood finishes and supplies.	34A
627	**General Finishes Sales & Service Co.** ..... Wood finishing with sealacell process.	33A
628	**Giles and Kendall Co....** Knockdown cedar chest & aromatic red cedar lumber.	32A
629	**Greenlee Tool Co.....** Electric drill bits. Special offer—woodworking calculator, 25¢.	10A
630	**Hammett Company, J. L.** Handicraft supplies. Free catalog.	32A
631	**Hardwood Corp. of America** ..... New 1957 school shop lumber catalog.	29A
632	**Hays Hardwood Lumber Company** ..... Domestic and foreign shop and furniture lumber.	32A
633	**Indianhead Archery & Mfg. Co.....** Archery and leather kits. Send 10¢ for catalog.	34A
634	**Kassell & Co., L. H.....** Lamp parts and electrical supplies.	32A
635	**Kester Solder Co.....** Flux core solder.	33A
636	**LeBlond Machine Tool Co., R. K.....4th cover** Complete line of lathes.	

(Index continued on next page)

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INDUSTRIAL ARTS AND VOCATIONAL EDUCATION June, 1957
400 North Broadway, Milwaukee 1, Wisconsin

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60	65	610	615	620	625	630	634	638	642	646	650	654	658	662	666	
61	66	611	616	621	626	631	635	639	643	647	651	655	659	663	667	
62	67	612	617	622	627	632	636	640	644	648	652	656	660	664	668	
63	68	613	618	623	628	633	637	641	645	649	653	657	661	665	669	
64	69	614	619	624	629	67A	651A									

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62	67	612	617	622	627	632	636	640	644	648	652	656	660	664	668	
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639	**Mayline Co.** Metal plan file and drafting table.	24A
640	**Metal Crafts Supply Co.** Tools, materials & supplies. Send 50¢ for catalog.	32A
641	**Millers Falls Co.** Dyno-mite Power workshop.	8A
642	**Mittermeier, Frank** Imported carving tools, hobbycraft sets.	34A
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664	**Stoner Wood Products Co.** Shop furniture.	34A
665	**Tolerton Co., The** Drafting and drawing tables.	29A
666	**Ursutz Burner Co.** Burners for melting cast iron.	34A
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668	**Weston Electrical Instrument Co.** Electrical measuring instruments.	21A
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SHOP EQUIPMENT NEWS

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0609	**Sales Service Machine Tool Co.** No. 00 Press-Rite Press with New Feature	32A
0610	**Chicago-Latrobe Co.** Extra Long Drills	33A
0611	**Charles Bruning Co., Inc.** New Tracing Paper	33A
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0617	**Dreis & Krump Mfg. Co.** Catalog on Chicago Press Brakes	27A

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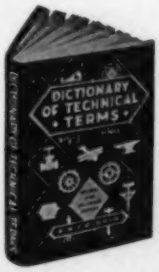

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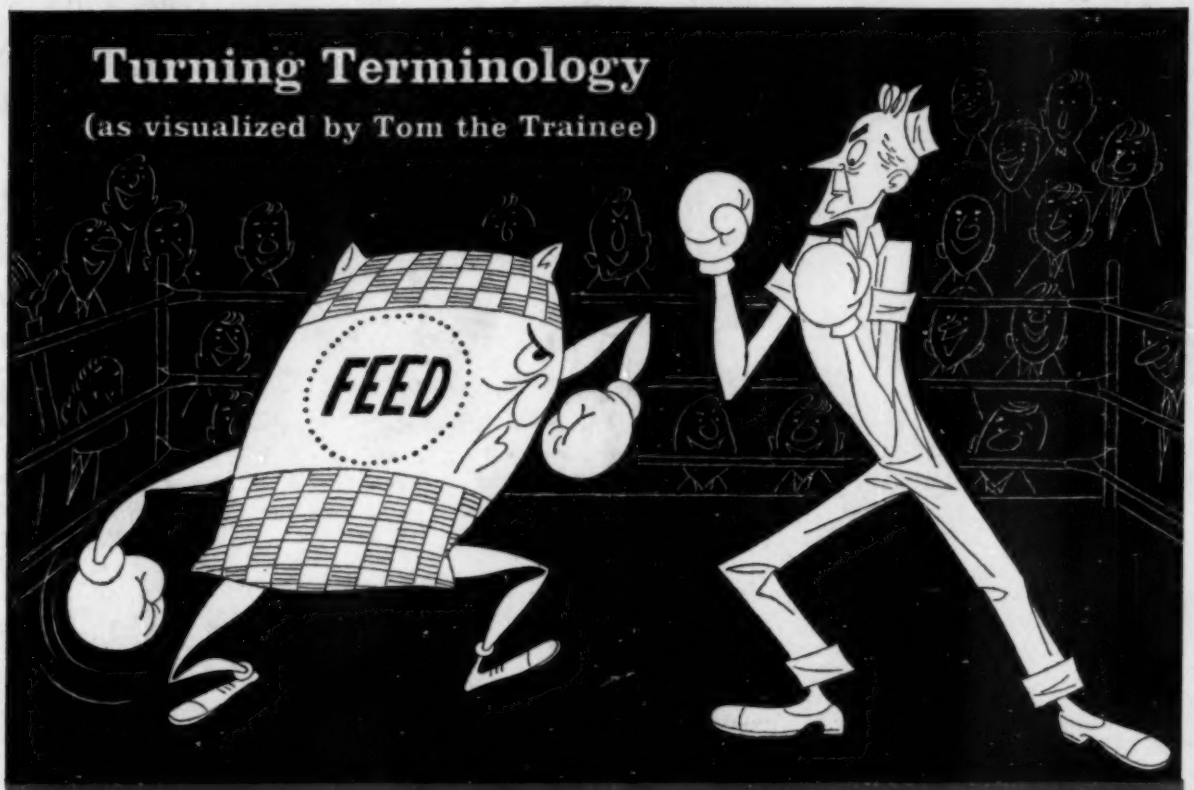

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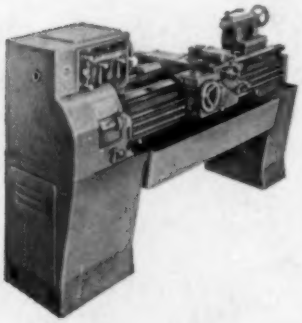
Tom's most important round begins when he graduates from the training shop to industry. He'll get along far better if he learns the big-lathe way of engaging the feed and other operations. That's why you'll want to train him on a LeBlond Regal — the low-cost lathe with big-lathe features.

You get *both* lead screw and feed rod on the Regal for accurate thread-chasing, dependable feeds. Foolproof selection of 48 feeds and threads is yours with the new automatically lubricated quick change box. The Regal's new 12-speed headstock with combination gear belt drive gives smooth power throughout the entire range. Hardened and ground replaceable steel bedways are fitted to LeBlond compensating vee-way principle for better distribution of cutting forces. Life long sturdiness and protection from dirt are built into the double-walled, one-piece apron.

You're sure of teaching the latest big-lathe practice with LeBlond Regal Lathes. You give shop students the up-to-date training they will need to step into competitive modern industry. Chances are the first lathe they encounter on the job will be a LeBlond — first choice for America's production lines as well as for today's leading training shops. Regals are available in 13", 15", 17", 19", 21", 24" sizes. Also a 13" bench model. Have your LeBlond dealer demonstrate these new Regal features to you or write for Bulletin R-201 T.



The R. K. LeBlond Machine Tool Company

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World's Largest Builder of a Complete Line of Lathes for More than 70 Years

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